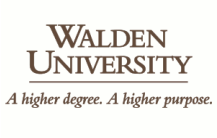

2015

Advantages and Barriers to Transformational Leadership Implementation in a Scientific Laboratory

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This is to certify that the doctoral dissertation by

Rachelle Smith

has been found to be complete and satisfactory in all respects,
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2015Abstract

Advantages and Barriers to Transformational Leadership Implementation in a Scientific Laboratory

by

Rachelle Smith

MS, Sam Houston State University, 2000

BS, Westminster College of Salt Lake City, 1990

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Applied Management and Decision Science

Walden University

February 2015

Abstract

Empirical evidence suggests that transformational leadership is positively correlated with job satisfaction, job performance, organizational commitment, and survivability. Although transformational leadership has been implemented in various organizations, little research has examined the issues in implementing transformational leadership concepts within a scientific laboratory. The purpose of this exploratory, qualitative case study was to examine (a) the current leadership style of the president of a scientific laboratory from the scientists', analysts', and technicians' perspective and their preferred leadership style; (b) the president's self-perceived leadership style and perceived subordinate style preference; and (c) the employees' perceptions of advantages and challenges to applying and implementing a transformational style of leadership. The laissez-faire, transactional, and transformational leadership models of Avolio, Bass, Burns, and Kouzes and Posner provided the theoretical basis for the case study. Data were collected from the president and subordinates and responses were coded and classified according to patterns and emerging themes. Results indicated that the president's current leadership style was transactional, whereas the subordinates' preference was transformational. The president's self-assessment of current style and perceived subordinate preference was found to be transformational. Subordinates expressed ideal and effective leadership qualities and shared advantages and barriers to transformational leadership. Leaders in scientific laboratories who apply these findings and implement more effective leadership may impact social change through increased subordinate job satisfaction and performance, thereby enhancing organizational survivability and improving the status quo.

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Dedication

This dissertation is dedicated to all those who had faith in me to complete this project and those who supported me along the journey.

Acknowledgments

I would like to thank Dr. Gary Gemmill, Dr. Branford McAllister, and Dr. Stephanie Hoon, my committee, for their guidance and support in pursing this journey.

My undying appreciation and love go out to my eternal husband, Larry Smith, who has been my most stalwart supporter. Without his love and encouragement, this doctoral adventure would not have been realized.

My family has also been a tremendous blessing with their encouraging words and love. Without them, I would not have learned the importance of continually learning and expanding my knowledge.

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Chapter 1: Introduction to the Study

Executives in highly technical organizations, such as scientific research laboratories, may practice leadership styles that are counterproductive to job performance, job satisfaction, and organizational commitment. I designed an exploratory, qualitative case study to determine current and preferred executive leadership style along with employees' perceptions of the advantages and challenges of transformational leadership implementation. This chapter begins with the background, the problem statement, and the purpose of the study. Study research questions, the theoretical framework, and the nature of the study are followed by definitions, assumptions, limitations, and the significance of the study.

Through this study, I sought to add to the body of knowledge by applying the transformational leadership model to a technical scientific field. With this knowledge, the implementation of transformational leadership may allow for a more productive, satisfied, and committed workforce, ultimately impacting organizational effectiveness and performance. The findings of the study may further the mission of social change by adding to the understanding of the implementation of transformational leadership in highly technical organizations.

Background

Leadership style has a significant impact on subordinate job performance, job satisfaction, and organizational commitment (Al-Hussami, 2008; Biswas, 2009; Jandaghi, Matin, & Farjami, 2008; Li & Hung, 2009; Piccolo & Colquitt, 2006; Walumbwa, Avolio, & Zhu, 2008; Webb, 2007). Highly technical organizations, such as scientific laboratories, may practice leadership styles that are counterproductive to performance, satisfaction, and commitment and could benefit from transformational leadership (Barnowe, 1975; Farris & Cordero, 2002; Keller,

1995). In a study of job performance of scientists and engineers, Barnowe (1975) found that in situations of low autonomy and limited communication, performance was lower than in cases where autonomy and communication were high. Farris and Cordero (2002) discovered in their study of leaders in technical organizations that the commanding and controlling behavior of leaders lowered retention and satisfaction among subordinates. Keller (1995) studied the group performance of 66 industrial project groups and learned that leadership behavior affected the quality of project outcomes. Studies examining transformational leadership implementation in healthcare (Spinelli, 2006), educational institutions (Webb, 2007), and other social science realms prevail, while limited literature exists on the implementation of transformational leadership in technical organizations.

Some research (elaborated in Chapter 2) indicated that technical fields, such as research and development organizations, practice autocratic leadership (Barnowe, 1975; Baumgartel, 1956). Other research indicated that participative leadership, such as transformational leadership, influences and moderates followers' job satisfaction and job performance, which, in turn, impact organizational commitment and survivability (see, for example, Al-Hussami, 2008; Ali, Babar, & Bangash, 2011; Biswas, 2009; Boerner, Eisenbeiss, & Griesser, 2007; Chih & Lin, 2009; Korkmaz, 2007; Li & Hung, 2009; Othman, Mohammed, & D'Silva, 2013; Raja & Palanichamy, 2011; Salman, Riaz, Saifullah, & Rashid, 2011; Zahaeri & Shurbagi, 2012).

The transformational leadership model has been studied and applied to organizations such as schools, the military, hospitals, and banks. Chipunza and Gwarinda (2010) studied how the transformational leadership model impacted employees of two institutions of higher education in South Africa involved in a merger. Nguni, Sleegers, and Denessen (2006) examined

the leadership effects of transformational leadership on Tanzanian primary school teachers. Dvir, Avolio, and Shamir (2002) analyzed the transformational leadership model within a sample of 54 military leaders and their 90 direct subordinates and 724 indirect subordinates. Bass, Avolio, Jung, and Berson (2003) applied the transformational leadership model in a study of 72 infantry platoon leaders in the U.S. Army. Kunzle, Kolbe, and Grote (2010) reviewed studies of transformational leadership implementation in critical care units and found the model to be effective. Majmuder, Jain, Chaudry, and Schwartz (2010) reviewed team performance and transformational leadership among a group of healthcare professionals guided by physician leaders. Parker, Yule, Flin, and McKinley (2012) focused their study on high-risk organizations such as a hospital operating room and examined the leadership behaviors of surgeons in terms of transformational leadership. Spinelli (2006) assessed the applicability of the transformational leadership model within hospital administration by examining the relationship between CEO leadership behaviors and subordinate managers' performance outcomes. Bushra, Usman, and Naveed (2011) and Lee, Cheng, Yeung, and Lai (2011) studied the implementation of transformational leadership within retail banks. In a meta-analysis of studies involving the transformational leadership model, Lowe, Kroeck, and Sivasubramanian (1996) discovered that the model had been applied to universities and school districts, private industry, government agencies, military branches, financial institutions, and hospitals.

Problem Statement

Leaders have a significant influence on subordinates (Bass, 1985). Studies have supported the impact of transformational leadership on improved job satisfaction, job performance, and organizational commitment (see Chih & Lin, 2009; Jones, Simonetti, &

Vielhaber-Hermon, 2000; Keller, 1992, 1995; Larsson & Vinberg, 2010; McCann, 2008; Nemanich & Keller, 2007; Nguni et al., 2006; Pedraja-Rejas, Rodriguez-Ponce, Delgado-Almonte, & Rodriguez-Ponce, 2006;) and are covered in greater depth in Chapter 2. Despite the popularity of transformational leadership throughout numerous organizations, limited research exists in identifying potential issues in implementation of transformational leadership within scientific laboratories. The problem addressed in this study was the lack of scholarly research on and understanding of the issues in applying and implementing transformational leadership concepts within a scientific laboratory.

Purpose of the Study

The purposes of this case study of a single scientific firm were to investigate subordinates' perceptions of current and preferred leadership style, to determine the current leadership style as well as the preferred style of subordinates as perceived by the president of the scientific laboratory, and to establish advantages and barriers to implementing transformational leadership. The research relied upon a three-part questionnaire, one portion of which was focused on leadership style. The questionnaire consisted of 45 descriptive statements, which required a response using a Likert-type scale as follows: 0 = *not at all*, 1 = *once in a while*, 2 = *sometimes*, 3 = *fairly often*, and
4 = *frequently if not always*. Further elaboration of the questionnaire is found in Chapter 3. Studying current and preferred leadership style in scientific laboratories and understanding the advantages and barriers that may be encountered when implementing transformational leadership may aid leaders in being more effective when managing scientists.

Research Questions

The following research questions were used in the case study to examine leaders' understanding of the practiced and preferred leadership styles of executive management in a scientific laboratory and employee-perceived potential transformational leadership implementation issues.

RQ1: What leadership style, as perceived by scientists, analysts, and technicians of a scientific laboratory, is the president currently using, and what leadership style do these personnel prefer?

RQ2: How does the president perceive her style as well as what she imagines her subordinates prefer?

RQ3: Based on the responses of the personnel regarding currently perceived and preferred leadership style, what advantages and challenges to transformational leadership implementation would these scientists, analysts, and technicians anticipate?

Theoretical Framework

The theoretical basis for this research was guided by the transformational, transactional, and nontransactional (laissez-faire) leadership models of Avolio (1999), Bass (1985), Burns (1978), and Kouzes and Posner (1995). These theories have been used and implemented in a variety of organizations, cultures, and countries. These theories define and shape leadership styles and behaviors, thereby rendering them straightforward, comprehensible, and manageable. These leadership styles encompass the majority of leadership behaviors, spanning the spectrum from uninvolved and absent to controlling and authoritarian. Bass's and Avolio's work has been implemented in healthcare and education organizations, and Burn's theories have been applied to politics. The theoretical base provided a leadership framework to assess which leadership style was most prevalent in a scientific laboratory and how implementation of the transformational leadership model might benefit similar organizations. These theories are discussed in depth in the literature review section of Chapter 2.

Nature of the Study

The method of inquiry to obtain information was an exploratory case study using a qualitative research methodology. Other methods were considered but not selected. One possible method was the use of a quantitative survey; however, this methodology was not appropriate, as the study was not based on hypothesis testing and part of the research was designed to determine perceptions through questions. Although applying a phenomenological approach to the study was considered, it was not chosen because leadership style is not a phenomenon and I did not seek to make generalizations. The currently practiced and preferred leadership style (transformational, transactional, or laissez-faire) as perceived by scientists, analysts, technicians within a scientific

laboratory was determined using a three part questionnaire based on (a) Bass's and Avolio's (2000) Multifactor Leadership Questionnaire (MLQ), (b) open-ended questions to validate preferred leadership style and discover advantages and challenges to transformational leadership model implementation as perceived by employees of the organization, and (c) demographics. The president's perceptions of current and preferred leadership style was established using a questionnaire based on MLQ questions.

Definition of Terms

Extra effort: The additional effort expended by individuals above the expected job duties and functions.

Laissez-faire leadership: Leadership style where nothing is transacted between leader and subordinate, inactive, absent, directive, and authoritative (Avolio, 1999).

Multifactor Leadership Questionnaire (MLQ): A short and comprehensive questionnaire that measures the full range of leadership styles.

Scientific laboratory: Facility where research, experiments, and measurements are performed.

Transactional leadership: Leadership style based on contingent reward and management by exception (Bass, 1985).

Transformational leadership: Leadership centering on autonomous or democratic approaches (Bass, 1985).

Assumptions

Assumption 1: Participants answered truthfully, honestly, and objectively. Anonymity and confidentiality were maintained throughout the study, and participation was completely voluntary.

Assumption 2: Reality for employees was based on participants' experiences and perceptions. The study was an attempt to view the implementation of transformational leadership from the viewpoints of participants.

Assumption 3: My opinions and viewpoints did not interfere with the unbiased collection of data in this study. I remained impartial, regardless of the results of the questionnaire.

Assumption 4: The selected participants were employees of a scientific laboratory.

Assumption 5: The data collected and analyzed were assumed to be accurate and unbiased, as well as to reflect the multiple voices of the participants.

Scope and Delimitations

Specific aspects of the research problem addressed in this study were (a) to determine the practiced leadership style within a technical scientific laboratory and (b) to establish transformational leadership implementation advantages and challenges. This focus was chosen to aid leaders in scientific laboratories with tools and resources in order to apply transformational leadership to improve performance, satisfaction, and survivability. The study was limited to the experience, knowledge, and behavior of the selected participants within the small laboratory setting and limited middle management. Findings and recommendations were not generalized to populations beyond the case study.

Participants were employees of a small, highly technical scientific laboratory located in North Texas. Of all the employees of the chosen laboratory, my focus was limited to scientists, analysts, technicians, and an administrator. In this study, I examined behaviors and actions of executive management, specifically leadership style and effectiveness, and established implementation issues through the use of the MLQ and semi structured open-ended questions.

Limitations

Limitations were weaknesses within the research that were outside my control. The limitations of this study were the following:

1. The analyzed data were from only one lab and may not be generalizable to laboratories with larger employee bases or differing organizational structures.
2. This study consisted of self-reported data from employees. Experiences and interests may have affected participants' answers.

Significance of the Study

This research increases the knowledge about the applicability of more empowering leadership styles, specifically transformational leadership, in a highly technical scientific laboratory. Identification of the practiced leadership style of executive leaders as well as the preferred style within scientific laboratories and determination of the advantages and challenges of implementing transformational leadership may contribute to the growth and sustainability of the organization. Higher job satisfaction, job performance, and organizational commitment suggest a more contented workforce, leading to a balanced and viable organization.

The project is valuable to the research community because research has suggested that transformational leaders aid their subordinates in performing better in technical research

organizations (Keller, 1995). The study was designed to determine whether this highly technical scientific organization would benefit from practicing empowering leadership styles, such as transformational leadership, and discovering advantages and challenges to implementation of transformational leadership. The results of this study will add to the body of knowledge by applying the transformational leadership model to a scientific laboratory.

Summary

This chapter outlined the problem and presented the background. The problem statement was formulated, and the purpose, nature, and significance of the study were outlined. Each research question was articulated, and the theoretical framework was expressed, followed by definitions, assumptions, scope, and delimitations. Limitations were described.

Executive leadership in research laboratories or other highly technical organizations may practice less effective leadership styles that are perceived to be detrimental to job performance, job satisfaction, and organizational commitment. Identifying the leadership style of executive leaders and determining advantages and challenges of implementing transformational leadership may contribute to the growth and sustainability of the organization. The research community recognizes the impact of transformational leadership on job satisfaction, job performance, and organizational commitment; however, further understanding of implementation issues is crucial (Ishikawa, 2012; Keegan & Hartog, 2004; Keller, 1992, 1995, 2006; Kim, Min, & Cha, 1999).

The study, based on the transformational leadership model of Avolio (1999), Bass (1985), Burns (1978), and Kouzes and Posner (1995), was designed and implemented as an exploratory, qualitative case study to determine leadership style and effectiveness from both a subordinate's and an executive's perspective. Employees' perceived advantages and challenges

for implementation of transformational leadership within a small technical organization were also examined. Highly technical research organizations may benefit from empowering leadership styles, and a better understanding of the advantages and challenges of transformational leadership implementation may aid in influencing employee job satisfaction, performance, and commitment to facilitate change and growth in scientific laboratories.

The research questions focused on determining the current practiced leadership style and preferred style (transformational, transactional, and laissez-faire) being used by the president of a small scientific laboratory. The leadership style being used by the president, as perceived by the scientists, analysts, and technicians, and the self-perceived style of the president were determined using a questionnaire. Identification of anticipated advantages and challenges to transformational leadership implementation originated from open-ended questions on the questionnaire.

In Chapter 2, the theoretical foundation of laissez-faire, transactional, and transformational leadership are discussed, followed by a literature review. In the literature review, leadership is examined in terms of the practiced leadership style in research and development organizations, effective leadership, transformational leadership and job satisfaction, job performance, organizational commitment, and transformational leadership implementation. The methodology chosen for this study is located in Chapter 3. Discussion of the results of the study is found in Chapter 4, and in Chapter 5, interpretation of the results, implications of the study, and recommendations are included.

Chapter 2: Literature Review

Introduction

Exploration of the current leadership model practiced by an executive and identification of advantages and barriers to the implementation of transformational leadership as perceived by employees of a highly technical scientific laboratory were the purposes of the present study. Empirical evidence supports the relationship between transformational leadership and job satisfaction, job performance, and organizational commitment and survivability. It is conceivable that such an intervention can encourage employees to remain satisfied in their job functions, perform their tasks more efficiently, and increase revenue and overall performance of the organization by improving the self-worth and dignity of the employees themselves.

Transformational leadership has been implemented in social science, medicine, military, retail, hospitality, and other realms (Bass et al., 2003; Brown & Arendt, 2011; Bushra et al., 2011; Dvir, Avolio, & Shamir, 2002; Hargis, Watt, & Piotrowski, 2011; Idris & Ali, 2008; Ishikawa, 2012; Kim et al., 1999; Kunzle et al., 2010; Lee et al., 2011; Lowe et al., 1996; Majmuder et al., 2010; McCann, 2008; Pagell & LePine, 2002; Parker et al., 2012; Spinelli, 2006). Keller (1992, 1995, 2006), Keegan and Hartog (2004), Ishikawa (2012), and Kim et al. (1999) suggested that research and development organizations may benefit from transformational leadership. As there was little data or literature describing transformational leadership implementation in highly technical organizations, this study investigated the relevance of transformational leadership in technical scientific laboratories as well as presented the advantages and challenges to transformational leadership implementation as perceived by scientists.

Chapter 2 contains a review of the literature search strategy, the theoretical foundation of full range of leadership, and transformational leadership implementation. The literature review section of the chapter encompasses leadership functions, leadership in research and development (R&D) organizations, and effective leadership. The concluding sections incorporate transformational leadership and job satisfaction as well as transformational leadership and job performance, followed by transformational leadership and organizational commitment and survivability.

Literature Search Strategy

Literature was obtained using Walden University and Sam Houston State University databases, specifically EBSCOhost and ProQuest Dissertations. Seminal works were found using the book catalog at Sam Houston State University. Google Scholar was the search engine of choice to acquire literature not available on either library database. Effective search terms included *leadership theory*; *transformational*, *transactional*, and *laissez-faire leadership*; *implementation*; *healthcare*; and *education*. Combined terms were *transformational leadership and job satisfaction*, *transformational leadership and job performance*, *transformational leadership and R&D organizations*, *transactional leadership and scientific laboratories*, and *transformational leadership and organizational commitment*. Literature searching consisted of searching seminal works and peer-reviewed journal articles relating to transformational leadership, transactional leadership, laissez-faire leadership, and the influence of leadership style on performance, satisfaction, and commitment. Implementation research literature was confined to healthcare and education.

Theoretical Foundation

Transformational, transactional, and laissez-faire leadership theories provided the theoretical context for this study. Burns (1978), Bass (1985), Kouzes and Posner (1995), and Avolio (1999) determined that leadership styles being practiced at the time were dictatorial, domineering, oppressive, and autocratic. Current leaders, at the time of their writings, were discovered to be cool, aloof, as well as analytically and emotionally detached from their subordinates. In most organizations, upper management controlled all of the resources (such as time, money, materials, and people) and remained uninvolved in the daily internal processes (Kouzes & Posner, 1995). Covey (1990) also recognized that "although our society values democracy, most companies practice autocracy" (p. 285). These authors postulated that the ever-changing and dynamic organizational climate required a new leadership paradigm transitioning from confrontational and directive to a more empathic, collaborative, and participative archetype.

In the response to the perceived need for a new paradigm, Burns (1978) introduced the concept of the transformational leader. Bass (1985) and Avolio (1999) magnified Burns's paradigm to revolutionize leadership to embody a repertoire of leadership behaviors and styles. Kouzes and Posner (1995) adapted the transformational leader paradigm by building upon successful leadership practices to improve leader effectiveness. Within this new paradigm, the leader's role changes from commander, order giver, and decision maker to developer, consultant, and mentor (Covey, 1990).

Laissez-Faire Leadership

Bass's (1985) and Avolio's (1999) leadership theory contains three major components: laissez-faire, transactional, and transformational leadership. Laissez-faire leadership, or

nontransactional leadership, was defined by Avolio (1999) as the absence of relationships between leader and subordinate. Leaders practicing this leadership style may be perceived by subordinates as being inactive or absent and portray to their subordinates an uncaring attitude. These types of leaders tend to avoid accountability and responsibility and are satisfied to sit and wait. Laissez-faire leaders are nonreactive, not proactive, and may be content to keep the status quo (Avolio, 1999). These leaders lean toward a more hands-off approach to problem solving or contact. Historically, research and development (R&D) organizational leaders fell into this category because leaders did not want to stifle scientific creativity and innovation (Baumgartel, 1956).

Laissez-faire leadership is considered the least effective leadership style because these leaders provide little to no guidance to their subordinates. Leaders lacking the attitude of jumping in and getting work done are less motivating and actually inhibit the growth of both subordinates and the organization. Poor leadership performance and a lack of vision create a static and stagnant work environment. As a result, teams, work groups, and individuals may be less satisfied and less productive, thereby affecting organizational and economic performance.

Transactional Leadership

Transactional leaders tend to be directive and authoritative and develop relationships between themselves and subordinates based on performance, inducements, and rewards, and they are influenced by individual self-interest (Avolio, 1999; Bass, 1985). Tactics implemented by transactional leaders may tend to coerce cooperation and compliance from subordinates through contingent reward or management by exception. Leaders applying contingent reward concepts tend to compensate subordinates based on behavior, make bargains to maximize performance,

constantly praise, and have a good opinion of their subordinates regardless of their actions. Management by exception is the opposite of contingent reward in that leaders communicate negative feedback, scrutinize performance, express discontent with poor performance, and point out deficiencies, take disciplinary actions without explanation, and monitor deviations.

Transactional leadership has been found in the literature to be more effective than laissez-faire leadership because transactional leaders are more involved in their relationships with subordinates (Seidman & McCauley, 2011). Contingent-reward transactional leaders focus more on task execution and promise reward based on performance, whereas, management-by-exception leaders tend to be more controlling and watch for disciplinary opportunities and deficiencies. Avolio (1999) found that transactional leaders were less likely to be found in innovative and creative environments; however, in some organizations, transactional leadership may be the most appropriate. Transactional leadership is used mainly when something or some process goes wrong and negatively impacts an organization, and, at times, interventions with reproof or penalization may be counterproductive and create situations of distrust and animosity (Bass, 1985). Some possible unintended consequences, ascertained by Bass (1985), include the following: damaging effects on morale and performance, reacting to manipulations, and reprimands generating undesirable behavior and anxiety, which may lead to dysfunctional behavior.

Transformational Leadership

Transformational leadership involves raising the awareness of subordinates about higher considerations through verbalization and role modeling. A transformational leader directs the transformation of an organization Bass (1985) and Avolio (1999) defined transformational

leaders as individuals who transcend their own interests for the growth of the organization through commitment and motivation. Transformational leaders take ownership and pride in the outcome and stimulate or alter the strengths of the subordinate. An effective transformational leader recognizes subordinates' needs, supplies vision, motivates subordinates to do more than originally expected, exudes self-confidence, and conveys an inner strength. A transforming leader will do the right thing rather than what is popular or accepted and avoid using authority and power to coerce followers' compliance. Every organization has a culture—defined in terms of core values, basic philosophies, and technical, financial, and humanistic concerns (Bass, 1985)—and transformational leaders work to change this culture through organizational policies, norms, and values.

A transformational leader demonstrates autonomy, arouses hope, and is moral, visionary, and dedicated (Burns, 1978), as well as charismatic, inspiring, individually considerate, and intellectually stimulating (Bass, 1985). Charismatic leaders are innovative, creative, and inspire in their followers an unquestioning loyalty and devotion without regard to their own self-interest. Charisma is most evident during states of crisis, emotional disturbance, or when organizations are transitioning.

Inspiration instills arousal and heightening of motivation among followers (Bass, 1985). Inspirational leaders are not reliant on charisma but on self-generated emotional feelings and sentiment. Inspirational leaders, like charismatic leaders, lack inner conflict and use emotional support and appeals, stimulating motivation in order to transcend self-interest (Bass, 1985). Effective inspirational leaders appeal to one's sensation and intuition and emphasize persuasive appeals to faith rather than reason. Characteristics of inspirational leadership behavior include

the ability to stimulate enthusiasm, build confidence, inspire belief in a common cause, and use a variety of other individual and institutional practices to emotionally arouse subordinates.

When a transformational leader uses individualized consideration, each subordinate is treated differently according to his or her individual needs and capabilities. Individualized consideration is an important aspect of leader-member relationships or exchange as the leader tends to be friendly, informal, close, and approachable. Effective leaders treat subordinates as equals, as well as give advice, help, support, and encouragement. These leaders set an example to be followed, assuming subordinates desire to follow a role model, and assign tasks individually to help significantly alter their followers' abilities and motivations (Bass, 1985). Six ways a leader could use individualized consideration are delegation, promotion of familiarity and contact with subordinates, effective use of communication, individualized subordinate treatment, counseling, and mentoring.

Intellectual stimulation, the last component of Bass's (1985) transformational leadership model, is said to heighten efforts within subordinates. Intellectual stimulation generates problem awareness and problem solving, thought and imagination, and values and beliefs. Intellectually stimulating leaders concentrate on strategic thinking and intellectual activities in tasks of analysis, formulation, implementation, interpretation, and evaluation. Organizational executives using intellectual stimulation are able to discern, comprehend, visualize, conceptualize, and articulate the opportunities and threats to the organization and determine the organization's strengths, weaknesses, and comparative advantages.

Transformational Leadership Implementation

Transformational leadership is integral to the success of any organization (Jandaghi et al., 2008). In a comparison of successful and less successful companies in the manufacturing industry, Jandaghi et al. discovered that leaders in successful companies were more likely to apply transformational leadership traits. In organizations, effective leadership is not limited to issues of finances and material resources but extends to the growth and development of personnel. Successful organizations need dynamic and progressive leadership because competent leadership provides resources and manages support systems. Organizational success relies on efficient and effective processes of the management team.

Challenges may be present in all organizations, especially at the administrative level (Spinelli, 2006), and leaders and administrators need subordinate cooperation and smooth working relationships in order to meet the challenges. Spinelli found, while investigating the relationship between leadership effectiveness and employee satisfaction in a study of subordinate managers from five hospitals, that subordinates' perception of self-reported outcomes of extra effort, leader effectiveness, and subordinate job satisfaction was linked to leadership style. The participants indicated that transformational leadership was most applicable and effective in administrative settings and that both transactional and transformational leadership were central to organizational success and survivability. Organizations implementing both transactional and transformational leadership at the administrative level, like the hospitals in the study, showed a higher likelihood of success than organizations relying on only one leadership style.

The influence of transformational leadership on satisfaction, performance, and organizational survivability has been measured in a variety of organizational types.

Implementation of transformational leadership has been executed in private and public institutions, in organizations in several countries, and at differing leadership levels within organizations (Lowe et al., 1996). Lowe et al. studied Fortune 500 firms, academic institutions, industry, government agencies, military, an air delivery firm, financial establishments, corporations, and medical companies. Transformational leadership implementation was performed within the Israeli military (Dvir et al., 2002); Taiwanese small and middle sized firms (Chen, 2004); Swedish manufacturing, hospital, and retail operation organizations (Larsson & Vinberg, 2010); a pharmaceutical R&D group (Jones et al., 2000); a U.S. apparel manufacturing firm (McCann, 2008); information technology professions (Bennett, 2009; Reid, 2011); a spiritual organization (Sarlak, Javadein, Esfahany, & Veisah, 2012); hospitality firms in Canada and the United States (Brown & Arendt, 2011; Gill, Flaschner, & Shachar, 2006); South African institutions of higher education (Chipunza & Gwarinda, 2010); medical, hospital, and nursing groups (Azaare & Gross, 2011; Cummings, Macgregor, Davey, Lee, Wong, Lo, Muise, & Stafford, 2010; Nielsen, Brenner, Randall, & Borg, 2008; Parker et al., 2012; Roberts, Hacker, & Beigel, 2010; Spinelli, 2006); telecommunications organizations (Berson & Avolio, 2004); Chinese retail banks (Lee et al., 2011); Chilean small firms (Pedraja-Rejas et al., 2006); and an acquired and integrated firm (Nemanich & Keller, 2007).

Leaders implementing transformational leadership have been effective at improving satisfaction, performance, and organizational survivability (Bennett, 2009; Berson & Linton, 2005; Egri & Herman 2000; Gilley, McMillan, & Gilley, 2009; Spinelli, 2006). Results of a study of cadets in the Israel Defense Forces (IDF) School for Leadership Development by Dvir et al. (2002) supported the hypothesis that transformational leadership has a positive impact on

followers' performance ($F_{5,26} = 3.45$, $p < .02$). In a study of 357 participants from 9 Indian organizations, Biswas (2009) confirmed that transformational leadership had a positive and significant influence on employee performance through organizational communication ($r = .44$, $p < .01$). Comparing transformational leadership in successful and less successful Iranian manufacturing companies, Jandaghi et al. (2008) concluded that transformational leadership was exhibited more significantly in the successful companies ($P < .0001$) and posited that the less successful companies implementing such leadership behaviors would lead to improved performance. In a study of 570 elementary school teachers, Li and Hung (2009) discovered that job performance was positively impacted by transformational leadership behaviors through leader-member relationships. Vecchio, Justin, and Pearce (2009) performed their study with 223 principals and 342 head teachers from California public high schools and determined that transformational leadership positively influenced performance ($p < .05$). Walumbwa et al. (2008) discovered in their study of employees of six banks in two Midwestern states in the United States that transformational leadership related to higher job performance through individual identification with the work unit.

Implementation of transformational leadership concepts within complex and technologically driven organizations, such as R&D laboratories, requires leaders to provide a vision to lead, inspire, and motivate their subordinates (Bennett, 2009). Bennett examined full range of leadership (i.e., laissez-faire, transactional, and transformational leadership) and Information Technology (IT) employees' perceptions in predicting their extra effort, the leader's effectiveness, and satisfaction with their supervisor. Data indicated that transformational leadership was perceived by the employees more often than either of the other two leadership

styles and, overall, transformational leadership had the strongest effect on employees' perception of extra effort, leader's effectiveness, and job satisfaction. Respondents preferred working with leaders using transformational leadership behaviors.

Effective leaders assist their subordinates in expending extra effort and endeavor to offer a satisfying workplace (Bennett, 2009). In a study of employees within a U.S. corporation where organizational structures, policies, and procedures constantly change, Hater and Bass (1988) asked subordinate employees to rate their immediate supervisor's effectiveness and their overall satisfaction with the supervisor. They concluded that more educated employees desiring development of abilities and personal growth would be more satisfied under the tutelage of transformational leaders rather than transactional leaders who reward performance.

Effective leaders inspire a sense of purpose and mission, stimulate new ways of thinking and problem solving, and encourage extra effort (Keller, 1992, p. 498). Keller (1995) studied full range leadership among project teams of 462 scientists and engineers from chemical, electronics, and scientific instrument industries and discovered that respondents preferred transformational leadership because they helped highly educated individuals achieve more than is expected and encouraged innovation and creativity (Keller, 1995). In another study, Keller (2006) chose professional employees from scientific instruments, semiconductor, energy, petrochemical, and aerospace R&D industries because scientists and engineers work autonomously and their performance may be influenced by the leader's behavior. Keller found that transformational leaders effectively guide researcher's innovations, originality, and dissemination of knowledge.

Transformational leadership may be preferred by scientists, engineers, and professionals as established through full range leadership studies (Bennett, 2009; Hater & Bass, 1988; Keller,

1992, 1996, 2006). There is limited research published studying leadership styles and leader effectiveness in technical analytical laboratories as well as difficulties that may arise in implementing transformational leadership. Using full range leadership as a model, the research questions in the present study attempted to investigate the current practiced leadership style (e.g., laissez-faire, transactional, or transformational) in an analytical laboratory followed by ascertaining advantages and barriers to implementing transformational leadership. The study findings build upon the existing body of knowledge by confirming the results of Hater and Bass, Bennett, and Keller and included implications for implementation in technical organizations.

Leadership Functions

Leaders integrate subordinate's individual actions, contributions, and define specific roles (Zaccaro, Rittman, & Marks, 2001). For a team or organization to perform and achieve success the leader is responsible for coordinating, planning, and communicating. Roles and responsibilities should be identified and delineated to the subordinates in order to avoid confusion, frustration, and dissatisfaction. Recognizing the attributes and skills of each subordinate may aid the leader in developing effective teams.

Leaders are responsible for managing personnel and material resources (Zaccaro et al., 2001). Execution of individual job function is facilitated by material utilization. Properly supervising individuals and teams and allocating necessary resources is required for a successful organization. Managing personnel involves obtaining the appropriate individuals, motivating them to perform, coordinating activities to ensure task completion, and monitoring their progress (Zaccaro et al.). The manner in which leaders manage their subordinates and resources indicates the difference between success and failure (Hackman & Wageman, 2005). A leader who is

incompetent or destructive can undermine performance by improper allocation of subordinate's time, energy, and efforts or by misappropriation of materials and/or supplies.

Diagnosing problems impeding performance, communicating and implementing solution plans, and defining critical activities and responses for specific solutions are additional functions of a leader (Zaccaro et al., 2001). When problems arise in any organization or situation, Zaccaro et al. suggested that a) the leader approach the problem, b) determine suitable and obtainable solutions, then c) communicate these solutions to the appropriate individual(s). Proper and open communication between leaders and subordinates promotes self-confidence and inspires trust (Curtis & O'Connell, 2011). Once a bond of trust has been established subordinates may offer suggestions to aid in problem-solving and providing solutions.

Individuals in leadership positions can influence the development of organizational norms, operating procedures and provide training (Zaccaro et al., 2011). Operating procedures allow leaders to monitor the health and well-being of the organization and cultivate individual and collective flexibility and adaptability. Training offers individuals the skills and abilities needed to perform their tasks. With these procedures in place leaders can properly allocate resources, correct deficiencies and short falls, and redistribute workload (Day, Gronn, & Salas, 2004).

Leaders guide team collaborations and motivate team members. Day et al. (2004) suggested that motivating team members requires planning, coordination, personnel development, and feedback based on survey results obtained while studying professionals in Fortune 100 companies. Individuals, teams, and leaders utilize feedback to stimulate and encourage themselves and others. Curtis and O'Connell (2011) determined, while studying

effective nursing management in healthcare work environments, collaborations between leaders and subordinates inspire creativity and innovation. As a result of their study, Day et al. implied that leaders who utilize team collaborations and motivate team members may develop a competitive edge and an increased likelihood of sustained organization success.

Leaders create, foster, promote, and maintain shared understanding, direction, vision, and meaning (Conger, 1999; Zaccaro et al., 2001). Zaccaro et al. formulated a theoretical model in which an effective leader works with subordinates to create an environment that is conducive to openness and understanding. Leadership effectiveness can, according to Zaccaro et al., be measured by high levels of group performance, requiring teams to develop values, standards, and operating procedures. Fostering and promoting shared direction, vision, and meaning necessitates constant open communication between leaders and subordinates. In a comparison of three dominant transformational leadership theories, Conger (1999) determined that leaders maintain direction by being an example and guiding subordinates toward the organization's vision, goals, and objectives.

Being supportive of subordinates and promoting skills and capabilities is also a function (Burke, Stagl, Klein, Goodwin, Salas, & Halpin, 2006). Burke et al.'s (2006) framework illustrates the relationship between leadership functions, leadership behaviors, and team performance conditions and was used to verify that effective leaders allow subordinates to improve skills through training and instruction. By supporting their subordinates, leaders are able to improve performance, satisfaction, and commitment. Goodwin, Whittington, Murray, and Nichols (2011) discovered in their study of leadership style and trust that subordinates who are satisfied in their workplace perform tasks in a more diligent and efficient manner and show

higher levels of trust and loyalty. Well-organized and time-saving performance increases effectiveness and productivity within organizations, thereby, increasing capital, resources, and stability.

Some organizations may have leaders that demonstrate destructive managerial leadership (Skogstad, Einarsen, Torsheim, Aasland & Hetland, 2007). Skogstad et al. studied 2,273 Norwegian employees and identified destructive leadership functions as lacking initiative and action, which was detrimental to subordinate satisfaction, subordinate job performance, and organizational commitment and survivability. Pushy and aggressive leaders created frustration and stress within the team or workgroup. This frustration and stress may lead to conflict and burnout. According to Skogstad et al., ineffective leaders were absent or lacked a presence, not involved in the daily workings of the organization, provided no feedback, and failed to provide rewards for performance. Therefore, the functions of these leaders were opposite to those that empower, support, and encourage subordinates.

Leadership in R&D Organizations

In the research literature, there is a plethora of data supporting leadership style influencing organizational performance and commitment. However, studies of leadership style in scientific laboratories are limited. Barnowe (1975) stated, in a seminal study of leaders working in 81 subunits of a large research organization, that leaders achieve productivity and effect lab effectiveness. In order for labs to be effective, perform well, and survive, its leaders' practices and skills need to be supportive rather than task oriented, exercise general supervision instead of close, and employ participative not autocratic attitudes. Baumgartel (1957) noted in a study of 18 lab directors while investigating leadership styles of laboratory leadership, that participative

approaches to leading resulted in higher motivation levels of scientists and Barnowe discovered that scientific productivity was higher with autonomy and some coordination by supervisors; however, too much or too little coordination was counterproductive.

Many R&D organizations have scientific leaders having no formal training in management or leadership practices (Elkins & Keller, 2003; Paulsen, Maldonado, Callan, & Ayoko, 2009). Elkins and Keller (2003), in their meta-analysis of R&D leadership studies, determined managers and leaders need to possess certain skills in addition to technical expertise. . Wong (2006) established from interviews with top executives from pharmaceutical R&D companies that researchers spend the majority of their time focused on narrow scientific questions, designing experiments, and budgeting resources for said experiments (p. 1171). Leaders manage budgets, prioritize time, delegate tasks, motivate team members, and provide leadership. Scientists can be very difficult to manage and do not respond well to change (Wong, 2006, p. 1171).

Key attributes to successful R&D leaders are determination, drive and diligence, passion, broad experience, flexibility, inspiration, and leadership (Wong, 2006). Farris and Cordero (2002) stated that “technical leadership needs to change from commanding and controlling people to leading them” (p. 13) and the new leadership paradigm for technical organizations needs to focus on rewarding, appraising performance and leading. The transformational leadership paradigm was applied to technical organizations by Thite (1999), Ishikawa (2012), and Kim et al. (1999). The findings suggested that successful leaders in technical organizations exhibit traits such as inspiration, confidence, intelligence, and determination. Additionally, teams became a little more accepting of differing opinions and new ideas and effective leaders need to

be not only technical experts, but strategic planners, team-builders, champions, and gatekeepers. In the study of 511 R&D engineers and scientists, Berson and Linton (2005) learned that both transformational and transactional leadership styles were practiced by leaders, with transformational leadership style being more important for success.

Effective Leadership

Teams are a basic unit within an organization and effective leaders are essential in determining the success or failure of implementing work systems (Kunzle et al., 2010). Technical laboratories are complex environments where teamwork, leadership, and communication are crucial to performance and survivability. Kunzle et al. discovered that an effective leader embodies not only technical knowledge but also education and experience. Effective leaders within complex organizations address internal and external environmental factors using transactional and transformational leadership behaviors in order to accomplish the tasks (Kunzle et al.). Critical transactional leadership behaviors include coordinating, prioritizing, organizing, and assigning work tasks and leaders maintain standards to clearly identify tasks and communicate how tasks are to be accomplished. Transformational leaders increase mutual trust, manage cooperation between team members, strengthen job satisfaction, build commitment, support, and develop team. Other traits exhibited by transformational leaders include: show consideration and concern for the needs and feelings of others, provide feedback, and demonstrate and model positive and appropriate behaviors (Kunzle et al.).

Supervisor behavior, moods, and expectations affect team members and group performance (Cohen & Bailey, 1997). Cohen and Bailey noted higher performance in cases where the supervisor spent minimal time with monitoring team performance and expended more

time on problem analysis and planning. Effective leaders manage and resolve conflicts as well as using collaborations. Sharing of diverse knowledge, skills, and experiences with subordinates promotes learning and improvements, another aspect to effective leadership (Pagell & LePine, 2002). Pagell and LePine learned that when effective leaders organized the work around the output, team members communicated informally, and the leaders expressed trust in the team. Yukl (2008) concluded that effective leaders in organizations need to be flexible and adaptive, understand the complex situations and influence others to perform better. He further stated that when faced with increasing challenges and uncertainty leaders may need to modify behaviors, strategies, and formal structures.

Trust is an important factor in effective leadership (Goodwin et al., 2011). In a study of employees representing manufacturing, government agencies and departments, and healthcare, Goodwin et al. asked the employees to evaluate their manager's leadership style and level of trust. The findings supported their hypothesis that trust is correlated with transformational leadership and that when trust in their managers is low subordinates were less effective as employees tended to be nonproductive. In contrast, subordinates with high trust levels in their manager felt empowered, confident, and their loyalty to the organization increased. These subordinates displayed positive attitudes, higher task performance, extra effort, and organizational commitment.

Effective leaders empower and engage their subordinates (Curtis & O'Connell, 2011). In a study of nursing management in healthcare organizations, Curtis and O'Connell learned that by empowering and engaging subordinates, they offered suggestions for solutions. They also realized that empowerment increased the probability that subordinates would be more satisfied

and remain with the organization. Conger (1999) stated that transformational leaders use empowerment to influence subordinates instead of dictatorial strategies to induce compliance based on a comparison of transformational leadership theories. Leaders who empower and engage subordinates show the level of trust that exists between parties. Increased trust may lead to greater job satisfaction, job performance, and organizational survivability.

Transformational Leadership and Job Satisfaction

Transformational leadership influences subordinate job satisfaction (Al-Hussami, 2008; Korkmaz, 2007). Al-Hussami (2008) and Korkmaz (2007) investigated the relationship between transformational leadership and job satisfaction and found that transactional and transformational leadership correlates positively with job satisfaction, and transformational leadership is a predictor of job satisfaction. Nursing staff working in Florida nursing homes were found to be more satisfied working under transformational leaders (Al-Hussami) and the more a teacher perceived the principal as displaying transformational leadership behaviors, the higher the teachers' job satisfaction level (Korkmaz). Korkmaz discovered that higher levels of pleasure in the workplace dictated higher degrees of job satisfaction, also noting that job satisfaction affected an individual's self-confidence level. Low job satisfaction results from low compensation, lack of resources, poor leadership style, stress in the workplace and poor job satisfaction might cause aggressive behavior towards others (Korkmaz).

Transformational leaders can help followers achieve their full potential by creating desirable workplaces. A more pleasant environment may allow followers to develop their potential and lead to higher job satisfaction. Job satisfaction levels influence follower retention (Al-Hussami, 2008; Korkmaz, 2007) in that retention affects morale by initiating negative

physical and emotional effects. Retention rates may lead to heavier workloads, motivation issues, inadequate training, increased tensions, and lack of respect (Al-Hussami). These negative effects in the workplace are counterproductive to desirable workplaces and, hence, affect job satisfaction. A healthy work environment is created through the relationship of transformational leadership and job satisfaction. Transformational leaders enhance workplace relationships by incorporating individual value systems into the organizational culture (Korkmaz). These leaders communicate the notion that staff identity with the common organizational identity will promote mutual relationships and motivation, and encourage their subordinates by intellectually stimulating staff to adopt creative thinking and problem solving.

Job satisfaction and leadership style impact organizational health (Korkmaz, 2007). Korkmaz ascertained that when a job allowed personal development, positive outcomes included a happy work environment, good relationships between leaders and co-workers, and participation in decision-making processes. Higher job satisfaction directs organizational health, which measures mutual individual relationships, plays a role in the overall success and sustainability of an organization, and demonstrates the level of social interaction and harmony between key personnel. In general, leadership shapes the learning climate, relationships, and morale (Korkmaz). Transformational leaders implement innovation, which translates into good relationships in the workplace. Korkmaz found that transformational leadership was more desirable than transactional leadership, and transactional leadership behaviors impacted negatively on organizational health. The negative impact of transactional leadership potentially decreases organizational health.

Job satisfaction is also influenced by transformational leadership and transactional leadership through the use of vision, intellectual stimulation, and contingent reward (Vecchio et al., 2008). Vecchio et al. found that follower job satisfaction was more enhanced when leaders utilize vision and intellectual stimulation rather than through the use of contingent reward. They discovered that transformational leadership did not augment the relationship between transactional leadership and job satisfaction and that contingent reward negatively moderates the relationship. Therefore, many alternative forces may be driven by job satisfaction, and leadership style may not be the primary component (Vecchio et al.). Other facets of transactional leadership, such as management by exception or laissez-faire, may have revealed additional insight. The augmentation effect was more prevalent with transactional leadership than transformational leadership with respect to contingent reward; however, Vecchio et al. speculated that contingent reward may have a greater value in explaining job performance rather than job satisfaction.

Transformational Leadership and Job Performance

Individual and organizational performance is influenced by organizational culture and leadership style (Biswas, 2009). According to Biswas, organizational culture equates to shared values, beliefs, and assumptions among members and facilitates mobility, trust, inter-dependence, and other facets of organizational communication. While studying 357 managers at 9 Indian organizations, Biswas learned that within organizations leaders frame policies and procedures as well as create, transmit, and maintain the organizational culture. Employee perceptions, demeanor, and behavior are impacted by leaders.

Communication contributes to an organization's effectiveness, and is an essential requirement to attain organizational aims and objectives (Biswas, 2009). Organizational communication is a means to disseminate organizational values and missions and acts as the conduit for organizational culture. Transformational leaders utilize communication to influence employee performance and retention. Internal sources of communication within an organization between members are facilitated by trust and that the communication direction, from the top downward versus from the bottom upward, as well as the message, influences both sender and receiver (Biswas). Organizational communication is influenced by transformational leadership because leaders communicate plans, actions, and decisions, encourage mutual trust, and persuade members to attain personal goals (Biswas).

Organizational communication and feedback activities reflect a leader to member exchange leading to an individual's commitment and motivation in the workplace (Biswas, 2009, p. 622). This exchange of communication binds individuals by sharing cultural norms and increases supervisor related commitment by helping managers and leaders transform subordinates' performance objectives as complementary to the overall organizational goals and mission. Feedback facilitates employee performance and improves organizational effectiveness and the lack of effective organizational communication and poor feedback may lead to barriers between supervisors and subordinates (Biswas). Organizational communication, when used constructively, aids in individuals' commitment to the organization and facilitates motivation for positive performance and involvement. Shared information between leaders and subordinates sets job standards, clarifies performance expectations, and contributes to individual growth and development (Biswas).

Transformational leadership links leadership style and job performance through leader-member and co-worker relationships (Li and Hung, 2009). Their study focused on the four dimensions of transformational leadership--individualized consideration, inspirational motivation, idealized influence, and intellectual stimulation—and the influence on performance. The findings indicated that transformational leadership gave members more autonomy and responsibility which impacted work attitudes, job satisfaction, organizational commitment, well-being, task performance, role conflict, role clarity, and turnover intention. Transformational leaders provided feedback assistance, sharing of information, and emotional support through stress reduction, dissatisfaction minimization, and turnover. Li and Hung also learned that employees' experience and interpretation of leader's behavior could further the development of leader-member exchange and co-worker relationships, thereby influencing performance and survivability

The way followers consider their jobs was associated with transformational leadership (Piccolo & Colquitt, 2006). In a survey of individuals from different job types across multiple undefined organizations in several industries, Piccolo and Colquitt discovered that transformational leaders enhanced commitment to vision and inspired followers to create new answers to problems. As a result, the effects of core job perceptions were transmitted through follower reactions to the leader. Because "leaders define and shape the reality in which followers work" (Piccolo and Colquitt, p. 327) their study focused on testing the direct effects of transformational leadership on task performance and organizational citizenship behavior through the use of core job characteristics (variety, identity, significance, autonomy, and feedback). Piccolo and Colquitt found that transformational leaders encourage creativity, provide

constructive feedback, and induce extra effort in order to facilitate high levels of task performance. In order to affect individual performance transformational leaders (a) persuade followers to forgo personal interests for the sake of the collective, (b) culminate individual and organizational goals leading to cooperation and positive contribution, (c) influence followers to judge work environment by using verbal persuasion and communication, (d) view work goals in congruence with individual values, (e) utilize stimulation and seek new perspectives in order to develop new ways to perform job tasks with variety and autonomy, (f) coach and teach through autonomy and feedback, (g) urge followers to view jobs as more significant, and (h) inject meaningfulness into the organization and followers work (Piccolo & Colquitt, pp. 328-329). Implementing transformational leadership behaviors allowing subordinates to focus on job characteristics may promote increased job performance within the organization.

Transformational leadership stimulates employee motivation and affects peak job performance (Piccolo & Colquitt, 2006; Webb, 2007). Motivation leads to higher task performance because positive performance creates a positive demeanor (Piccolo & Colquitt). Individuals, therefore, derive satisfaction from task accomplishment and strive harder to excel at work. Motivation decreases task withdrawal in behaviors, such as daydreaming, breaks, and socialization and can also improve the individual's acquisition of task related skills (Piccolo & Colquitt). Laissez-faire leadership style is frustrating to subordinates and less effective in influencing job performance through motivation. The results from Webb's study of vice presidents and chief officers in Christian institutions indicated a negative correlation between laissez-faire style with motivation, which may be because leaders and workers lacked interaction with one another. Transactional leadership was better at affecting job performance of

subordinates; however, this leadership style did not facilitate personal growth, motivation, or loyalty. Transactional leaders based motivation on reward or punishment and focused mostly on negative feedback. Transformational leadership, of the leadership styles, was most effective at influencing motivation and job performance. The effectiveness of leaders using transformational leadership was measured by the effect of the leaders' behavior on followers. Subordinates verbalize feelings of admiration, respect, trust, and appreciation. Webb discovered that under a transformational leader's tutelage, subordinates were motivated to provide extra effort and work to higher levels of personal expectation and individual commitment. In addition, workers are motivated when leaders model self-confidence, high energy, personal conviction, power, and assertiveness (Webb).

Higher levels of motivation are achieved when leaders use aspects of both transactional and transformational leadership (Webb, 2007). Webb showed that the leaders in the study of administrators in Christian institutions increased motivation toward extra effort when they provided specific plans for contingent reward, and cultivate organizational cultures of affirmation, consideration, and appreciation. Management by exception and laissez-faire styles were found to decrease motivation toward extra effort. Subordinates did not respond well to micro-managers or absent leaders. Based on the study findings, individuals were more motivated toward extra effort when working for leaders whom the employees perceived as courageous, confident, empowering, caring, considerate, and willing to recognize and reward positive contributions. Leaders guided the development of systems, methods, and behaviors to create a motivated workforce. Leaders who were able to increase subordinate motivation decreased absenteeism and augmented productivity, loyalty, confidence, and a stronger sense of emotional

well-being (Webb). Through the implementation of transformational leadership and contingent rewards, leaders can expand motivations and increase performance and production. Transformational leadership and job performance influence organizational survivability.

Job performance and task engagement are driven by leaders (Piccolo & Colquitt, 2006). Individuals committed to job tasks perform better and perceive leaders to be more effective. In their study, Piccolo and Colquitt noted that some followers chose to resist management and negotiation processes and were less effective at executing tasks, thereby, and exhibiting lower job performance. Leaders depend upon the willingness of individuals, either through inclination or pressure, to form "subordinate reality" (Piccolo & Colquitt, p. 327). Some subordinates avoid change and are resistant to transformational leadership behavior. When subordinates resisted their leaders, the subordinates perceived a low quality leader-member relationship and felt formal and impersonal communication was insufficient to encourage change (Piccolo & Colquitt).

Transformational leaders embody intellectual stimulation, individualized consideration, and idealized influence. Subordinates content with the status quo and lower job performance standards may be resistant to transformational leaders due to a desire not to seek new perspectives and develop new ways to perform job tasks. Resistance and poorer job performance may also arise when subordinates are uncomfortable with the lack of direct supervision as a result of more autonomy and feedback. Therefore, they may perform better under transactional leaders. Individuals lacking morality or ethicality may resist leaders who emphasize moral and ethical consequences of job tasks. Consequently, subordinates' job performance is linked to leadership style and task engagement.

The economic climate of organizations needs to be dynamic, competitive, and ever-changing (Reuvers, van Engen, Vinkenburg, & Wilson-Evered, 2008; Zagorsek et al., 2009). Flexibility, responsiveness, and efficiency in organizations may be increased through the use of continuous innovation, organizational performance, and innovative work behavior (IWB). Transformational leaders stimulate more IWB and creativity through interrelated tasks such as idea generation, idea promotion, and idea realization. Followers are influenced by transformational leadership through the connection of self-concept to organizational mission and modification of values and self-esteem. Transformational leaders shift goals from personal interest towards self-actualization and followers are motivated by a fear of disappointing their leader. Leaders induce followers to reevaluate potential problems and work environment by cultivating the creation of new ideas and motivate followers to perform and implement (Reuvers et al.).

Organizational learning is connected to performance (Zagorsek et al., 2009). Leadership is an important aspect to organizational learning. The four constructs of organizational learning focus around acquisition, distribution, and memory (i.e., behavioral and cognitive change) and were incorporated into Zagorsek et al.'s study of Slovenian leaders representing a variety of organizations. The study findings indicated transactional leaders providing incentives in exchange for subordinates performance and task completion led to compliance but subordinates were compliant but acted without extra effort or enthusiasm. Transactional leaders in learning organizations were perceived by subordinates as information centers for each unit or team and organizational learning was mainly in the acquisition and distribution constructs. Transformational leaders, however, encouraged open, honest, and timely communication,

fostered dialogue and collaboration, and promoted expression of differing viewpoints and ideas. In organizations using transformational leadership, leaders challenged old assumptions and stimulated new perspectives. Transformational leaders were perceived by subordinates to facilitate their ability to create and use knowledge, which assisted in cognitive and behavior changes among the unit or team within a learning organization.

Organizational learning is promoted by leaders who interchange between transformational and transactional leadership styles in accordance with the situation (Zagorsek et al., 2009). Zagorsek et al. focused on the effects of transformational leadership on organizational learning and how transactional leadership contributed to organizational learning in organizations of differing sizes, different functional backgrounds, and a wide range of industry. They found that leadership affected all four organizational constructs, with the greatest influence on memory. Transactional leaders implementing contingent reward were perceived by subordinates as consistent, dependable, and reliable, and these leaders were able to build trust with their subordinates. Transformational leaders were perceived as emphasizing goal setting, giving instruction, and clarifying structures and conditions. Leaders promoted learning at all levels. They created and established opportunities to acquire information, distribute information, meet, discuss, and interpret information, and encourage and support subordinates, which contributed to organizational learning and organizational performance. Organizational survivability relied on transactional leaders to build a solid foundation and transformational leaders to transcend. Consequently, Zagorsek et al. argued that organizations need open organizational cultures with trust and cooperation as core values in order to compete and survive.

Transformational leadership relates to follower attitudes, behavior, and performance through followers' level of work unit identification, self-efficacy, and means efficacy (Walumbwa, Avolio, Zhu, 2008). Successful transformational leaders are able to convince followers that identity is tied to the mission of the organization and exert powerful and enduring effects on followers' work behavior. Transformational leaders emphasize individual contributions to the group and influence followers' view of identity. Walumbwa et al. discovered in their study of bank employees and supervisors that work unit identification was linked to performance via a motivation to achieve goals. Strong identification and employee attachment with a work unit or organization encouraged higher job performance (Walumbwa et al., p. 798). Self-efficacy influenced an individual's choice of goals and goal directed activities and means efficacy relied on an individual's visualization of the value of available resources as critically important (Walumbwa et al.) Better performance was attained when employees believed in both their own abilities and the means available at their disposal.

Transformational Leadership and Organizational Commitment and Survivability

Leaders influence an organization and increase efficacy and performance in an effort to sustain an organization (Jandaghi et al., 2008). Leadership unlike management includes a social influence and makes changes to the organizational culture to enhance efficacy and performance. Transformational leadership provides a new route for improvement and progress, especially in successful companies, by increasing creativity, motivating, and empowering subordinates to develop and increase capabilities (Jandaghi et al.). These leaders create awareness and acceptance of organizational goals and mission. Jandaghi et al., ascertained from the study of Iranian managers and employees, that successful companies incorporate aspects of

transformational leadership more than less successful companies. . Therefore, leaders who labor to improve the culture to enrich commitment are more likely to be successful and sustainable.

Transformational leadership and citizenship performance are related through employee job perception (Puranova, Bono, & Dzieweczynski, 2006). Puranova et al. discovered in their study of managers and employees participating in a leadership development program that job perception mediated leadership style and citizenship performance. The participants reported that transformational leadership linked job perception to organizational and societal goals through citizenship performance via job characteristics. The job characteristics connected work to motivation, job satisfaction, and job performance. Participative leadership, such as transformational leadership, predicts stronger citizenship rather than job performance and lead to autonomy (Puranova et al.). Having well performing organizations with motivated and satisfied employees allow for survivability.

Leadership style also helped to link work to employee identity (Puranova et al., 2006). Participants conveyed that employees under transformational leadership tutelage put in extra effort because their jobs were perceived as rewarding, meaningful, and important. Puranova et al. focused on the way leaders' influence employees' perception of their job through transformational leadership and citizenship performance. The participants reported a positive link between transformational leadership, job performance, and employees' organizational citizenship performance which is mediated through job perception. Organizational sustainability requires that employees perceive their job in a positive manner, stay motivated to expend extra effort, and follow their leaders to transform the organization to new heights and levels.

Organizational commitment and survival is impacted by transformational leadership (Ali, Babar, & Bangash, 2011; Boerner et al., 2007; Chih & Lin, 2009; Nguni et al., 2006; Othman et al., 2013; Piccolo & Colquitt, 2006; Purvanova, Bono, & Dzieweczynski, 2006; Raja & Palanichamy, 2011; Zagorsek et al., 2009). Boerner et al. (2007) interviewed 91 department heads and group leaders from German companies encompassing engineering, insurance, telecommunication, and banks to determine how transformational leadership impacts organizational performance. Transformational leaders influence organizational success through organizational commitment by stimulating subordinate organizational commitment and enhancing innovation. Piccolo and Colquitt (2006) hypothesized that transformational leadership is positively related to organizational performance, commitment, and followers' perception of core job characteristics, and performed a study of 283 individuals from a variety of job types and multiple organizations in industry, which the study findings supported. Respondents indicated that leaders exhibiting transformational leadership behaviors recognized higher levels of job characteristics leading to improved performance and commitment. Purvanova et al. (2006) focused their study on managers and employees from an aerospace manufacturing plant and a customer service department at a utility company. The study findings indicated that transformational leadership affected performance and commitment through job characteristics perception (r =.32, p < .01).

Zagorsek et al. (2009) surveyed 753 current and former students as well as alumni of a Slovenian University in an effort to learn transformational leadership would have a strong positive influence on organizational commitment and survival through organizational learning. The study findings indicated that a relationship exists through information acquisition,

distribution, interpretation, and changes in behavior. Chih and Lin (209) tested their hypothesis that transformational leadership style had a positive effect on organizational commitment by studying a sample consisting of individuals employed by firms in Taiwan incorporating electronics, semiconductor, biotechnology, and pharmaceutical industries. Data supported the hypothesis, implying that transformational leaders had a positive impact on employee organizational commitment. The more supportive the leaders were perceived, the more committed the employees became and that the organization was more likely to survive when the employees were committed. In a study performed by Nguni et al. (2006) of 560 teachers from primary schools in Tanzania, organizational commitment was exhibited by the teachers feeling proud of their association with the school. Their organizational commitment and job satisfaction were higher under transformational leaders.

Othman et al. (2013) sought to determine a link between transformational leadership and organizational commitment, especially among 151 Nigerian University lecturers undergoing postgraduate studies at Malaysian Universities. Transformational leadership behaviors were shown to be related to organizational commitment through generating enthusiasm, recognizing accomplishments, providing direction, and encouraging creativity. A significant correlation (r =.205, p <.01) between transformational leadership style and organizational commitment was realized by Ali et al. (2011) in a study of 277 medical representatives of Pakistan pharmaceutical companies. Raja and Palanichamy (2011) investigated the most preferred leadership behaviors amid transformational and transactional leadership styles and its impact on organizational commitment. The sample of 158 engineers from Bharat Heavy Electricals Limited was found to prefer transformational leadership styles and organizational commitment was higher among

subordinates of transformational leaders. Transformational leadership has been shown to impact organizational commitment and organizational survivability. Organizations wishing to improve subordinate commitment may benefit from applying transformational leadership concepts.

Summary and Conclusions

This chapter delineated the theoretical foundation of full-range leadership which incorporates laissez-faire, transactional, and transformational styles. Laissez-faire leaders are ones who provide limited or no guidance or interactions, Transactional leaders use contingent reward or management by exception to achieve organizational goals. Transformational leadership incorporates charisma, inspiration, intellectual stimulation, and individualized consideration. Effective leaders utilize their skills to become technical experts, planners, coordinators, team-builders, gatekeepers, visionaries, creators, and innovators.

Transformational leadership has been shown through an abundance of research to be an effective leadership style and influences job satisfaction, job performance, and organizational commitment and survivability. Current literature suggests that scientific organizations may profit from transformational leadership as leadership in R&D facilities is more transactional or laissez-faire. Scientists may be difficult to lead and having leaders who offer intellectual stimulation and individual consideration may be more likely to respond favorably to a more empowering leadership style. Researchers agree that organizations may benefit from transformational leadership, especially when laissez-faire leadership is present.

The study will fill a gap in the literature on implementation of transformational leadership by determining current leadership practices within a technical scientific laboratory and identifying advantages and challenges as perceived by scientists and technicians in

implementing transformational leadership. The transformational leadership model has been studied in schools, militaries, hospitals, healthcare facilities, and banks. Research showed that transformational leadership is applicable in these types of organizations and this study answers whether it is appropriate in scientific settings.

Chapter 1 provided the introduction to the present study along with the research questions. Chapter 2 entailed the literature review in terms relating to the research questions and background knowledge. In order to determine the appropriateness of transformational leadership in highly technical laboratories an exploratory, qualitative case study was designed and is discussed in Chapter 3.

Chapter 3: Research Method

Introduction

The objective of the study was to construct a case study using qualitative research methods to answer research questions about leadership style use in highly technical scientific organizations and the determination of advantages and challenges, as perceived by employees, to implementation of transformational leadership. The research questions being investigated were the following: (a) What leadership style, as perceived by scientists, analysts, and technicians of a scientific laboratory, is the president currently using, and what leadership style do these personnel prefer? (b) How did the president perceive her style as well as what she imagined her subordinates preferred?, and (c) Based on the responses of the personnel regarding currently perceived and preferred leadership style, what advantages and challenges to transformational leadership implementation did these scientists, analysts, and technicians anticipate? The major sections of this chapter pertain to the study setting; the research design and rationale; my role; the methodology, including participant selection, instrumentation, data collection, and analysis; threats to validity; trustworthiness; and ethical procedures.

Study Setting

Transformational leadership has been successfully implemented in a wide variety of organizations. However, there is little literature describing implementation in arenas such as highly scientific laboratories. I was interested in determining how transformational leadership could be incorporated in a technical, scientific laboratory with limited middle management. If the advantages and challenges to implementation could be determined within small groups, then

execution of this transition in larger laboratories might occur more smoothly. As the study relied on the perceptions of employees of their leaders, the employees were the key members impacting the study.

The scientific laboratory chosen for this study was a privately held small business located in Grand Prairie, Texas, with 15 scientists, analysts, and technicians; these, along with the president, were the individuals given questionnaires. The laboratory specializes in providing testing services using established microbiological, chemical, physical, and nutritional methodologies. This organization was founded in 1992 to offer product analysis and development, trouble-shooting, research, and routine laboratory analyses on a variety of sample types.

Research Design and Rationale

The method of inquiry to obtain information was an exploratory, qualitative case study. The case study approach was the most appropriate because there was no attempt to either change behavior or identify causality; rather, I sought just to measure variables as they existed. I used a subordinate questionnaire (see Appendix B) and an administrative questionnaire (see Appendix C), which encompassed questions from Bass's MLQ and open-ended questions, in the study. Questions on the MLQ focused on identifying the current and preferred leadership practices of the president in terms of laissez-faire, transactional, or transformational behaviors. The MLQ portion contained 45 descriptive statements, which required a response using a Likert-type scale: 0 = *not at all*, 1 = *once in a while*, 2 = *sometimes*, 3 = *fairly often*, and 4 = *frequently if not always*. The eight open-ended questions were used to determine advantages and challenges to implementation of a transformational leadership style as perceived by the employees.

The objective of this study was to ascertain the leadership style of the president of the laboratory, both from her own perspective and from the perspective of the scientists, analysts, and technicians. Each of the 15 scientists, analysts, and technicians was asked to respond to the subordinate questionnaire (see Appendix B), and the president was asked to respond to the administrative questionnaire found in Appendix C. To protect the identity and confidentiality of each participant, a copy of the subordinate questionnaire was sent electronically to an advocate within the laboratory and distributed as a self-administered questionnaire to the participants. An email was sent to the president with a link to the questionnaire for participation. The advocate was informed to have the questionnaire responses forwarded back electronically to my email. Upon return of the questionnaires, the data were compiled, scored using the MLQ scoring key (see Appendix F), and grouped by leadership behavior (i.e., idealized influence, inspirational motivation, intellectual stimulation, individualized consideration, contingent reward, management by exception, and laissez-faire). Scaled averages were calculated and compared between current style and perceived style. The answers to each open-ended question were coded according to emerging patterns.

Role of the Researcher

In qualitative studies, the responsibility of the researcher is to identify and recruit participants, obtain informed consent and supply materials to respondents, and collect data, followed by analyzing, interpreting, and summarizing the collected data. It was imperative that I preserve the confidentiality of the participants by avoiding collecting any information that could be traced back to specific individuals. Impartiality must be maintained by removing any

preconceived ideas or conclusions and avoiding the introduction of bias. To uphold the integrity of the research, threats to validity were addressed and overcome.

As it is more difficult to perform doctoral research within one's place of employment and sustain reliability of the data, the research was conducted in a facility similar to the scientific laboratory where I am employed. I have been on staff in my current capacity for 13 years, but prior to this position, I worked as an analyst in a technically scientific laboratory elsewhere. The chosen study participants were professionals having knowledge and experiences similar to mine. However, no associations with any of the employees of the laboratory existed, nor did I meet them in person, other than the advocate. No influencing factors or biases were introduced to the participants based on any relationships to me. No incentives were offered for participation and, to my knowledge, no conflicts of interest existed. No personal or identifying data were obtained regarding the identity of the participants, other than demographic information, to protect the confidentiality of participants.

Methodology

Participant Selection

Participants were chosen using purposive sampling. Purposive sampling occurs when participants are chosen for a particular purpose and may be most appropriate for certain research problems (Leedy & Ormrod, 2005). The rationale for this type of sampling for this case study was to work with a specific group to answer research questions regarding transformational leadership within scientific research organizations. Results from case studies are not necessarily generalizable but can build the basis for additional studies. Fifteen scientists, analysts, and technicians, identified as employees of the laboratory, were asked to participate and contacted

through an advocate at the laboratory, who acted as a liaison. The advocate, selected from among the scientists and known to me, distributed the questionnaires, and 13 responses were returned.

Population and Sample Size

This case study used a census of 15 scientists, analysts, and technicians, of which 13 participated, plus one administrator, the president, who did participate. This method of acquiring data required every member of the population to be questioned (Al-Subaihi, 2003). The scientific laboratory chosen for this study was similar in size and workload to my place of employment, having a mixture of scientists, analysts, and technicians in a small number. The laboratory also had a limited middle management structure, like my organization, which allowed more access to executive management by the subordinates.

Instrumentation

The scientists, analysts, and technicians received the subordinate questionnaire and the president was given the administrative questionnaire. These took no more than 60 minutes to complete. Both the subordinate questionnaire and the administrative questionnaire contained the MLQ questions in order to rate the perception of the leadership behaviors of the president. In general, MLQ questions, developed by Bass and Avolio (2000), (a) focus on individual behaviors, (b) assess leadership behaviors to motivate to achieve agreed upon and expected levels of performance, (c) emphasize development measures, and (d) gauge the leader's effect on both personal and intellectual development of self and others. In my research, answers to the MLQ questions focused on identifying the current and preferred leadership practices of the president in terms of laissez-faire, transactional, or transformational leadership behaviors. The

MLQ portion contained 45 descriptive statements, which required a response using a Likert-type scale.

The eight open-ended questions on the subordinate questionnaire were composed to determine, from the scientists', analysts', or technicians' perspective, their preferred leadership style and their perception of advantages and barriers to implementing transformational leadership. These questions were important to the research, as the responses conveyed the perceptions of the respondents, which were crucial to answering the research questions. The eight questions, listed below, are also found on the subordinate questionnaire in Appendix B.

Thinking of your preferred leadership style, please answer the following questions:

1. In your opinion, what characterizes an ideal leader?
2. What are characteristics of an effective leader?
3. If your ideal leader created and implemented a vision for the laboratory, describe any advantages you might envision.
4. Describe any challenges or barriers you visualize may be encountered by implementation of a vision.
5. What advantages or challenges might you foresee by having an empowering leader?

Aspects of transformational leadership include being a mentor and coach, offering individualized attention, and motivating and stimulating workers.

6. If your ideal leader demonstrates any of these behaviors, how would your organization benefit from these attributes?
7. What advice could you offer the president of your organization about the leadership style?

8. What aspects or attributes would you change in the president of your organization to match your ideal leader?

In addition to the MLQ questions, the participants were asked to provide information pertaining to demographics. Participants were asked to circle the appropriate response for gender, job position, and job tenure. Gender responses were male or female; job title choices were scientist, technician, or analyst; and time with the company selections were 2 years or less, 3 to 5 years, or more than 5 years.

The original MLQ questionnaire, developed by Bass and Avolio in 1985, was revised to the current version (Bass & Avolio, 2004) and has been used in a multitude of realms in the study of leadership style not only in the United States, but also in Japan, Taiwan, Israel, Sweden, and other countries. The MLQ instrument has also been given to participants in banking, the military, manufacturing, industrial, hospitality, hospitals, nursing, and education. The updated form is composed of 45 descriptive statements focused on identifying leadership style in terms of laissez-faire, transactional, or transformational behaviors. Each statement requires a response using a Likert-type scale of the following values: 0 = *not at all*, 1 = *once in a while*, 2 = *sometimes*, 3 = *fairly often*, and 4 = *frequently if not always*.

Permission to use the MLQ in this case study was granted by Mind Garden, Inc. and is included in Appendix A. The results generated from the MLQ in previous studies have been reliable in answering various research questions and the most appropriate assessment tool for determining leadership style and effectiveness. Lowe et al. (1996) performed a meta-analytic review of MLQ literature and studies and reported that since the inception of the measurement tool, it has been used in studies in a variety of organizational types, in several countries, and for

leaders in executive, middle, and low management positions. Cronbach's alpha values above 0.7 are typically considered acceptable and indicate reliability (Raja & Palanichamy, 2011). The MLQ was used in Keller's (2006) study of project leaders, Chih and Lin's (2009) study of employees of high-tech industries, Kim et al.'s (1999) study of engineers in Korean R&D organizations, and Lee et al.'s (2011) study of retail banks in Taiwan. Computed Cronbach's alpha reliability values were, respectively, 0.79, 0.857, 0.78, and > 0.7. Data from primary school teachers answering MLQ questions in a study by Nguni et al. (2006) indicated an alpha value of 0.9. Othman et al. (2013) and Raja and Palanichamy (2011) computed reliability of MLQ while studying university lecturers and engineers, with Cronbach's alphas as 0.86 and 0.83, respectively.

Procedures for Recruitment, Participation, and Data Collection

Each question on the questionnaire focused on a specific leadership style. The questionnaire included standardized directions to explain how to complete each section, and participants were asked to judge how often each statement applied to the president and their preferred leader using the following rating scale: 0 = *not at all*, 1 = *once in a while*, 2 = *sometimes*, 3 = *fairly often*, and 4 = *frequently if not always*. Each response was entered in the appropriate column.

Participants provided informed consent by agreeing to answer the questions on the questionnaire. Participants were notified that participation was strictly voluntary, responses would be held in confidence, and the case study was part of doctoral study for Walden University. If a participant wished to exit the study, all that was required was to not finish the questionnaire, and there was no penalty for voluntarily exiting the study. There was only one

data collection event, which required no more than 60 minutes per respondent. Each participant received the questionnaire, and his or her responses were collected, recorded, and returned electronically with no identifying information. The only demographic data collected consisted of gender, position level or job title, and years employed at the laboratory.

Data Analysis Plan

The participants' responses to the questionnaire questions were grouped, scored, and coded to determine the president's current leadership style as laissez-faire, transactional, or transformational from the perspective of the subordinates. The responses for the preferred leadership style of the employees were grouped, scored, and coded based on the answers given to the MLQ leadership questions. The president's perceived current leadership style and what she postulated her subordinates preferred were determined from the scored and coded responses to questions answered on the administrative questionnaire. The open-ended responses from the subordinates were coded and classified according to patterns and emerging themes. The MLQ responses were categorized into 10 areas and each response was coded with a score from 0 to 4. The 10 areas covered aspects of transformational leadership, transactional leadership, and nontransactional (laissez-faire) leadership behaviors. Each area of leadership behaviors had four questions, and the scaled scores were averaged for each category item on the rating scale. The calculated score for each leadership style was derived by summing up the score for each item and dividing by the total number of items in the scale. The scorecard was used to represent the leadership style of the president based on the perceptions of the subordinates, how each leadership behavior was used by the president, and how these behaviors compared to the preferred behaviors. The answers to open-ended questions were coded, categorized, and analyzed

for patterns, themes, and categories. Common patterns related to leadership behaviors and how the leader interacted with subordinates, and the benefits and challenges of more empowering leadership emerged.

Software used during the study consisted of Microsoft Office programs including Word and Excel. Graphs, tables, and statistics were generated using Microsoft Excel. Word was used to record and organize the answers to open-ended questions. To perform ANOVA, I used IBM's SPSS Statistics 22 software package.

Data cleaning and screening to detect errors in the data collection were performed using record matching, descriptive statistics, scatter plots, and logic checks. The data were reviewed for errors such as missing data or outliers, with each variable screened independently of the others. Descriptive statistics were used to check for normality by calculating mean, standard error, confidence intervals, standard deviation, median, minimum, maximum, range, and skewness.

Threats to Validity

Validity is used to determine if what is measured is what was intended. Internal validity deals with study design and external validity gauges generalizability. Common threats to external validity encompass applicability of findings to other groups or culture, small sample size, the subjects or setting, or reactive arrangements. To aid in reducing external validity in this case study, the participants answered the questionnaire questions in a comfortable and familiar setting to minimize stress. The participants and I had no contact and to protect confidentiality no identification was provided at any point. No additional communication was initiated between

participants and me. Because purposive sampling and a census was incorporated the participants are considered a homogenous group.

Internal validity threats include maturation (changes occurring within the participant), instrumentation, sample size, or mortality (attrition). To minimize internal validity, the study participants stayed in a familiar place to answer the questionnaire questions and used as much or as little time as needed. Decreasing discomfort and anxiety as well as valuing each participant's efforts assisted in lessening maturation. The MLQ instrument used to collect data is a standard, valid, and acceptable measurement tool; therefore, it did not pose an internal validity threat. Keeping the time required to participate to one event decreased mortality. Sample size in this study was small but the desired population is specific. The case study findings may or may not be generalizable; however, scientists and lab technicians in other analytical laboratories may have similar responses and perceptions.

Content validity is an organized review of the contents of questionnaire and open-ended questions to ensure that only the desired information is gathered and not any extraneous material and pilot testing identifies errors in the questionnaire form and presentation (Litwin, 1995). Using pilot testing provides a means to check the questionnaires with a small sample population to ensure that the instrument has no errors. Additionally, pilot testing may predict difficulties that may arise during actual data collection.

To validate content, a pilot study was performed. As the target population of the case study consisted of scientists and technicians, the subordinate and administrative questionnaires and a checklist (Appendix E) were given to a panel of scientists and technicians working in an analytical laboratory not associated with the study laboratory. For each questionnaire the

reviewer rated each question and scaled for appropriateness as a whole. The checklist was designed to determine any typographical or spelling errors, whether the vocabulary and questionnaire length were appropriate, if it flowed well, or contained sensitive items or cultural barriers. I reviewed each checklist response and performed the modifications as suggested by the participants. The corrected questionnaires were then sent to the advocate for distribution.

Compiling a codebook is a useful way to process responses to the questions and reviewing for conflicting answers, missing data, and patterns (Litwin, 1995). I compiled the data into a codebook and included comments from the pilot study, data collection activities, and content validation. Research decisions made during coding and review were also documented in this codebook.

Issues of Trustworthiness

To increase credibility and validity of the data I used triangulation. Open-ended questions responses were kept in its entirety with both positive and negative comments to validate each participant's viewpoint and perspective. The responses to the open-ended questions were compared to the data acquired from the MLQ to further validate the integrity of the results.

The study design was described in research contexts and assumptions were presented to establish credibility and transferability. The design was created in a way as to be dependable, such that the study results are repeatable in this setting or other scientific laboratories. Checking and rechecking the data and documenting the results in the codebook established confirmability.

Ethical Procedures

Using human beings as the focus of study, researchers must address ethical implications. Research participants must be protected from harm, give informed consent, have rights to

privacy, and honesty with professional colleagues (Leedy & Ormrod, 2005). Participants are not to be exposed to undue physical or psychological harm. The risk involved by participating in the study was minimized and not any greater than daily life risks. Steps were taken to ensure participants were not subjected to unusual stress, embarrassment, or loss of self-esteem. In this study there were no situations that would qualify as harmful and no follow-up was required.

Informed consent is critical in the research study. Participants were informed of the nature of the study and given the option to participate or not. The informed consent form contained details about the study, what was involved to participate-such as type of activity and duration of participation, nature of participation and the option to withdraw without penalty, guarantee of anonymity and confidentiality, my name and contact information- as well as other individuals that may be contacted, and the availability of detailed information about the study. Informed consent was assumed because the participant submitted the MLQ and answered the open-ended questions.

Research participants have a right to privacy and I respected that right. The nature and quality of performance were kept strictly confidential and I solicited no personal information about the participant. As the results of the questionnaire were received as email, I numbered the responses consecutively for data handling.

Researchers have an obligation to report findings completely and honestly without misrepresentation or misleading others regarding the findings (Leedy & Ormrod, 2005). Supporting conclusions by data fabrication is inappropriate and plagiarism should be avoided. Honest researchers give full acknowledgement when reporting findings and conclusions. In my

research, responses were kept in their entirety to maintain the integrity of the data and sources were given when suitable.

A Walden University Internal Review Board (IRB) review ensured ethicality in this case study. The review process included preparing a plan for sharing research results with stakeholders, describing anticipated risks and benefits of study participation including provisions to minimize risk, and identifying procedures to maintain data confidentiality and integrity. The approval number for this study was 06-16-14-0033768 and it expires on 15 June 2015. After receiving IRB approval I sent an email containing a consent form, the two questionnaires to review, and the checklist to the selected pilot study participants. Participants returned the checklist and questionnaires with their recommendations. The approved questionnaires were sent to the advocate and disseminated to the participants.

The response data is being kept on a transportable storage media device in order to maintain security and confidentiality. Access to files on the storage media is restricted to me and the data will be stored on the device for a minimum of five years after which the files will be deleted or destroyed.

Summary

This research performed was based on an exploratory, qualitative case study. Participants were recruited from a selected laboratory and were asked to complete a questionnaire containing questions from the MLQ and some open-ended questions to determine their perception of the president's leadership style and what advantages and challenges they thought might arise in implementing transformational leadership. In this chapter I outlined the specifics of the study, such as what methodology was used, how participants were selected and recruited, the

measurement instrument, data collection and analysis procedures, and ethical procedures. The data and findings will be presented in Chapter 4.

Chapter 4: Results

Introduction

The responses from the pilot study and how these responses impacted the case study are outlined in this chapter. Information regarding the study setting, study demographics, data collection, and data analysis activities are additionally found in this chapter. Evidence of trustworthiness of the collected data and the results of the study conclude the chapter.

The purposes of this case study of a single scientific firm were to investigate subordinate perceptions of current and preferred leadership style, to determine the current leadership style and the preferred style of subordinates as perceived by the president of the scientific laboratory, and to establish advantages and barriers to implementing transformational leadership. Three research questions were explored in this case study:

RQ1: What leadership style, as perceived by scientists, analysts, and technicians of a scientific laboratory, is the president currently using, and what leadership style do these personnel prefer?

RQ2: How does the president perceive her style as well as what she imagines her subordinates prefer?

RQ3: Based on the responses of the personnel regarding currently perceived and preferred leadership style, what advantages and challenges to transformational leadership implementation would these scientists, analysts, and technicians anticipate?

Study Setting

The setting for the exploratory, qualitative case study was a privately held small business located in Grand Prairie, Texas. The laboratory specializes in providing testing services using established microbiological, chemical, physical, and nutritional methodologies. This organization, founded in 1992, offers product analysis and development, trouble-shooting, research, and routine laboratory analyses on a variety of sample types.

Instrumentation

Reiterating what I described in greater detail in Chapter 3, the scientists, analysts, and technicians received the subordinate questionnaire and the president was given the administrative questionnaire. The subordinate questionnaire was divided into three parts. The first part contained 45 MLQ questions in order to rate the perception of the leadership behaviors of the president. The second part included eight open-ended questions relating to perceived advantages and challenges to transformational leadership implementation, and the third part solicited information pertaining to demographics. The administrative questionnaire also contained the 45 MLQ questions to identify the current and preferred leadership practices of the president in terms of laissez-faire, transactional, or transformational behaviors.

The MLQ measures aspects of each leadership style. Therefore, an individual will have a score for transformational, transactional, and laissez-faire styles. These scores can then be compared to the mean national norm range derived by Bass and Avolio (2004). When the score for the leadership style falls within the norm range, that particular leadership style is exhibited. When the leader focuses on the individual, transformational leadership is utilized and, as previously addressed, they may be more satisfied with their job and perform at higher levels.

Leaders applying transactional leadership style tend to be more focused on tasks and regulations. Therefore, these leaders may be less concerned about the individual and individual needs and concentrate more on performance and financial outcomes. Laissez-faire leaders are avoidant, absent, and pay little to no attention to individuals or performance. The leadership scores indicate, at that point in time, the leadership style being implemented.

Pilot Study

The pilot study—a small experiment—was performed in order to test the soundness of the research design and gather information prior to initiating the case study. The pilot study participants were asked to review the two questionnaires, review each question and scale for appropriateness as a whole, complete the checklist in order to reveal deficiencies in the study design or procedures, and recommend modifications. Of the five requests for participation, three participants agreed to contribute, and recommendations for modification focused mainly on typographical errors. These errors were corrected on the questionnaires prior to sending them to the advocate at the chosen laboratory for distribution to potential participants.

Results obtained from the pilot study did not impact the main study in any fashion except for modifying the questionnaires for errors, as discussed previously. There were some typographical errors found, and the reviewers stated where these were located. The reviewers indicated that the questionnaires were appropriate and they did not identify any task difficulties or detect any adverse effects.

Data Collection

Data collection activities consisted of a one-time event where each participant was asked to answer questions on either the subordinate questionnaire (Appendix B) or the administrative

questionnaire (Appendix C). The participants were allowed to respond in their own environment and use as much time as was necessary to answer the questions. The advocate distributed the questionnaires to 15 scientists, analysts, and technicians of which 13 were returned, yielding a response rate of 86.7%. The administrative questionnaire, given to the president and returned, rendered a 100% response rate.

I assigned a number to each questionnaire a number to separate each respondent's answers; however, no identifying information was annotated. The questionnaires were returned via email and these data files were stored on my storage device. I retrieved and compiled the data in an Excel spreadsheet to facilitate data analysis and management. The answers to the open-ended questions were kept in their entirety in the digital file.

Demographics

The demographics collected during the study were gender, job position, and tenure. These data were relevant to the effort to understand perceptions of leadership style with regard to the participant's gender; job in terms of scientist, analyst, or technician; and length of service at the laboratory. The demographic results for gender, position, and tenure are as follows. Of the 13 participants, seven were male (53.8%) and six were female (46.2%); therefore, there was not a large disparity with regard to gender.

The participants' job positions were distributed as follows: two scientists (15.4%), six analysts (46.2%), and five technicians (38.5%). For the purpose of this study, tenure was divided as 2 years or less, 3 to 5 years, and 5 years or more. The majority of participants (61.5%) had been employed for 2 years or less. Three had been there 3 to 5 years (23.1%) and two (15.4%)

had been there for 5 years or more. The mean tenure was 3.2 years, with a standard deviation of 3.215.

I tested the results of the demographic portion of the questionnaire to determine if there were any relationships between leadership scores and demographic categories. Tests for relationships between leadership style and gender, job position, and tenure are documented in the following section.

Relationship Between Current Leadership Style and Gender

To test whether there was a significant relationship between current leadership style and gender, I employed two-factor ANOVA. The leadership scores apportioned by leadership style gender are indicated in Table 1. Based on the ANOVA (Table 2), there was no statistical evidence to support a difference in scores based on either gender and leadership style ($F_{2,38}$ = .580, p = .715), nor is there a significant two-way interaction between style and gender ($F_{2,38}$ = .386, p = .683). I conclude that there was no difference in leadership score based on gender.

Table 1

Leadership Scores: Gender versus Leadership Style

Leadership Style	Male	Female
Transformational	2.6518	2.5313
Transactional	1.1071	0.9271
Laissez-faire	1.0714	0.8021

Table 2

Gender versus Leadership Style: Two-way ANOVA

Source	Sum of Squares	*df*	Mean Square	*F*	Sig
Corrected Model	1.563[a]	5	.313	.580	.715

Intercept	152.589	1	152.589	282.937	.000
Gender	.945	1	.945	1.752	.195
Style	.237	2	.118	.220	.804
Gender*Style	.416	2	.208	.386	.683
Error	17.797	33	.539		
Total	174.720	39			
Corrected Total	19.360	38			

Note. *R* squared = .081 (adjusted *R* squared = -.059).

Relationship Between Current Leadership Style and Job Position

To test whether a relationship between leadership style and job position existed, I employed a two-factor ANOVA. The assigned scores by style and job position are indicated in Table 3. Based on the ANOVA (Table 4), there was no statistical evidence to support a difference in scores based on either job position and leadership style ($F_{2,38}$ = .493, p = .851), nor is there a significant two-way interaction between style and job position ($F_{2,38}$ = .584, p = .677). I conclude, therefore, that there was no difference in leadership score based on job position.

Table 3

Leadership Scores: Job Position versus Leadership Scores

Leadership style	Technicians	Analysts	Scientists
Transformational	2.5	2.92	2.63
Transactional	1.3	3.71	1.25
Laissez-faire	1.0	0.917	0.625

Table 4

Job Position versus Leadership Style: Two-Way ANOVA

Source	Sum of squares	*df*	Mean square	*F*	Sig
Corrected model	2.250[a]	8	.281	.493	.851
Intercept	115.978	1	115.978	203.352	.000

Position	.716	2	.358	.628	.541
Style	.613	2	.307	.538	.590
Position*style	1.332	2	.333	.584	.677
Error	17.110	4	.570		
Total	174.720	30			
Corrected total	19.360	38			

Note. *R* squared = .116 (adjusted *R* squared = -.119).

Relationship Between Current Leadership Style and Job Tenure

To test whether a relationship between leadership style and job position occurred, I employed a two-factor ANOVA. The assigned scores by style and job tenure are indicated in Table 5. Based on the ANOVA (Table 6), there was no statistical evidence to support a difference in scores based on either job tenure and leadership style ($F_{2,38} = .694$, $p = .694$), nor is there a significant two-way interaction between style and job position ($F_{2,38} = 1.166$, $p = .346$). I conclude, therefore, that there was no difference in leadership score based on job tenure.

Table 5

Leadership Scores: Job Tenure versus Leadership Style

Leadership style	2 years or less	3 to 5 years	5 years or more
Transformational	2.68	3.0	2.38
Transactional	1.19	1.25	1.13
Laissez-faire	0.875	0.667	1.38

Table 6

Job Tenure versus Leadership Style: Two-way ANOVA

Source	Sum of squares	*df*	Mean square	*F*	Sig
Corrected model	3.110[a]	8	.389	.694	.694
Intercept	109.612	1	109.612	195.763	.000
Tenure	.267	2	.134	.239	.986
Style	.016	2	.008	.014	.789
Tenure*style	2.611	4	.653	1.166	.346
Error	16.798	30	.560		
Total	176.340	39			
Corrected total	19.908	38			

Note. *R* squared = .156 (adjusted *R* squared = -.069).

Data Analysis

Data Management

Performance of data analysis occurred after all the questionnaires had been returned and data collection had been completed. Using the MLQ scoring key format (Appendix F), I input the participants' answers to each question by question number into a table in an Excel workbook to facilitate data management. To group each item, I sorted the data by leadership behavior categories as idealized influence (attributed), idealized influence (behavior), inspirational motivation, intellectual stimulation, individualized consideration, contingent reward, management by exception (active), management by exception (passive), laissez-faire, extra effort, effectiveness, and satisfaction.

Subordinates' Scoring

The average item score per category was derived by summing the score and dividing by the number of items in that category (e.g., [1+3+2+3] ÷ 4 = 2.25). In the Excel workbook, I made separate worksheets for the average item scores for the subordinates' perception of current leadership, the subordinates' preferred leadership, the president's current leadership, and what the president perceived the preferred leadership style of her subordinates to be. The mean item score, minimum, maximum, and standard deviation for each category were calculated for both the subordinates' perception of the president's current leadership style (Table 7) and their preferred leadership style

(Table 8). All 13 participants answered all the questions for current leadership; however, for preferred leadership style, two participants did not respond to any questions. The nine leadership behavior categories map into the three leadership styles as follows: transformational leadership

encompasses the factors of idealized influence (attributed) idealized influence (behavior), inspirational motivation, intellectual stimulation, and individualized consideration. Transactional leadership behaviors involve contingent reward and management by exception (active), and laissez-faire behaviors include management by exception (passive) and laissez-faire.

Table 7

Subordinates' Current Assessment of Leadership by Item

Category	*N*	Min	Max	*M*	*SD*
Idealized influence (attributed)	13	0.5	3.5	2.29	0.835
Idealized influence (behavior)	13	1.75	3.5	2.33	0.504
Inspirational motivation	13	1.25	4	2.83	0.965
Intellectual stimulation	13	0	3.25	1.35	0.826
Individual consideration	13	0.25	2.75	1.60	0.899
Contingent reward	13	1.5	3.25	2.21	0.488
Management by exception (active)	13	0	3.5	1.88	1.223
Management by exception (passive)	13	1	3.5	2.08	0.915
Laissez-faire	13	0.5	4	1.71	1.00
Extra effort	13	0	4	1.79	1.24
Effectiveness	13	1.25	3	2.33	0.641
Satisfaction	13	1	3.5	2.15	0.747

Table 8

Subordinates' Preferred Leadership by Item

Category	*N*	Min	Max	*M*	*SD*
Idealized influence (attributed)	11	3	4	3.48	0.462
Idealized influence (behavior)	11	1	3.75	3.05	0.776
Inspirational motivation	11	2.75	3.75	3.23	0.370
Intellectual stimulation	11	1	4	3	1.04
Individual consideration	11	0	4	2.95	1.19
Contingent reward	11	2	4	3.11	0.582
Management by exception (active)	11	0	3.75	1.75	1.21
Management by exception (passive)	11	0	2.25	0.977	0.971
Laissez-faire	11	0	1.75	0.727	0.515
Extra effort	11	2	4	3.42	0.678
Effectiveness	11	2	4	3.34	0.517
Satisfaction	11	3	4	3.55	0.431

Administration Scoring

Data from the administrative questionnaire were also entered into Excel worksheets and compiled by category for both the president's self-assessment of current leadership style as well as her perception of what leadership style her subordinates preferred (Table 9). As there was only one president, there was only one response; therefore, no statistical data were generated. The item score was obtained in the same fashion as described previously.

Table 9

The President's Assessment of Leadership by Item

Category	Current assessment	Perceived preference
Idealized influence (attributed)	4	3
Idealized influence (behavior)	3.75	3
Inspirational motivation	3.75	3.25
Intellectual stimulation	3.5	2.75
Individual consideration	3.25	2.75
Contingent reward	3.5	3
Management by exception (active)	3.25	2.75
Management by exception (passive)	2.5	2.25
Laissez-faire	1.25	1.75
Extra effort	3.67	3
Effectiveness	3.75	3
Satisfaction	3.5	3

Index Scoring

To obtain the indexed scores by leadership type, the means of the average item scores were calculated and are represented in Table 10 for the subordinates' current leadership style perception, subordinates' preferred style, president's assessment of current leadership style, and president's perception of subordinates' preferred style. The average score for transformational leadership was calculated using the scores from the five factors previously outlined, followed by

computing an average transactional leadership score and laissez-faire average score from two factors, respectively. I compared these current indexed leadership scores by style as perceived by subordinates to a mean national norm score.

Table 10

Indexed Leadership Scores

Leadership style	Subordinate current assessment average score	Subordinate preferred average score	President current average score	President perceived subordinate preference average score
Transformational	2.08	2.75	3.68	3.00
Transactional	2.05	2.63	3.38	2.87
Laissez-faire	1.90	1.0	1.88	2.00

To aid in understanding issues surrounding transformational leadership application and implementation, the questionnaire contained eight open-ended questions. The questions were organized to ascertain, from the perspective of the scientists, analysts, and technicians, the advantages and challenges to implementation of a more empowering leadership style like transformational leadership. I reviewed the answers from each participant in order to view any recurring themes or patterns. One common theme emerging was personality traits and behaviors of an ideal and effective leader.

Evidence of Trustworthiness

In Chapter 3, I outlined the plan for establishing credibility, transferability, dependability, and confirmability. Credibility was determined through methodological triangulation through the use of questionnaire answers and written answers. The responses from the open-ended questions from each participant were compared to their answers to the corresponding MLQ questions. Transferability refers to the degree to which findings can be generalized to other situations or locations. Because this is an exploratory, qualitative case study, the findings may be transferable to other scientists, analysts, and technicians in other laboratories as these individuals may have similar experiences. However, the case study was designed just to measure variables as they existed and not change behavior or identify causality. The questionnaires were designed to be repeatable so that everyone who participated was asked identical questions. These questionnaires can be given to other individuals in small, medium, and large sized scientific laboratories and the results would be similar. The MLQ is a dependable instrument, as documented in Chapter 2, used and evaluated in research and independent studies throughout the world in diverse cultures and groups. The data and calculations were checked and rechecked for errors and missing data and documented in a codebook. Use of the codebook to check and recheck data established confirmability.

Study Results

I centered this exploratory, qualitative case study on three research questions. The findings and results for each question will be discussed in this section.

Research Question 1

The first research question was to address what leadership style, as perceived by scientists, analysts, and technicians of a scientific laboratory, was the president currently using and what leadership style was preferred by these subordinates. Each question on the questionnaire corresponded to nine leadership behaviors that represented a leadership style and focused into laissez-faire, transactional, or transformational. A score for each of the nine leadership behaviors was obtained and combined into the three leadership styles and is, hereafter referred to as the *indexed leadership score*. Current and preferred leadership styles were then defined from these indexed scores. The leadership style with the highest score was the dominant style; however, the other styles may also be present.

Bass and Avolio (2004) established, from studies using the MLQ, a national norm range for indexed scores. They instituted a benchmark score for each item within each leadership style, as follows: idealized influence-attributed *(2-3)*, idealized influence-behavior *(3-4)*, inspirational motivation *(3-4)*, intellectual stimulation *(3-4)*, and individual consideration *(2-3)*, contingent reward *(2-3)*, management by exception-active *(1-2)*, management by exception-passive *(0-1)*, avoidant *(0-1)*. The transformational leadership mean norm *(2.5-3.5)*, transactional leadership mean norm *(1.5-2.5)*, and laissez-faire mean norm *(0-1.5)* are visually represented in Figures 1, 2, and 3 as the green box, the yellow box, and the red box, respectively. The current and preferred leadership indexed scores were compared to the mean national norm range and are illustrated below.

The current indexed leadership scores by style as perceived by subordinates in Table 10 were compared to the mean national norm score, and graphically represented in Figure 1.

According to the scientists, analysts, and technicians, the president's current transformational leadership index score was 2.08, transactional leadership index score was 2.05, and laissez-faire leadership score was 1.90. Based on these indexed scores, the president's leadership style is predominately transactional because the score fell within the norm range for this leadership type. However, she is also perceived as exhibiting laissez-faire leadership more than the national group and transformational leadership less than the national group.

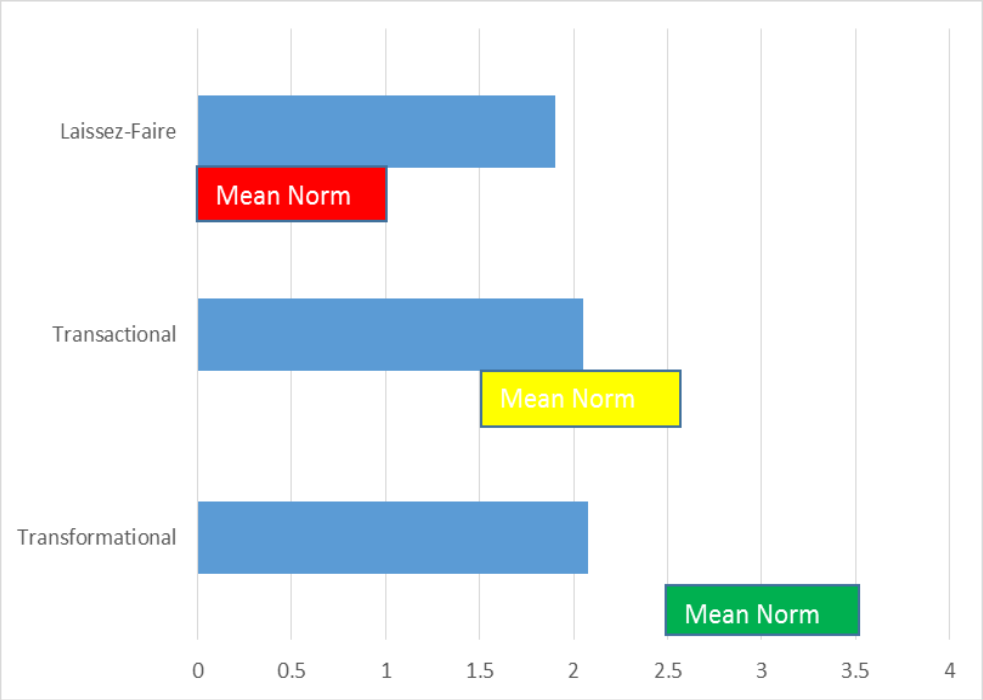

Figure 1. Subordinates' perceptions of the president's current leadership style.

To assess the subordinates' preferred leadership style, the indexed scores from Table 10 were graphed and compared to the mean national norm (Figure 2). The subordinates' preferred leadership style was, for the most part, transformational indicated by the indexed score within the

mean norm; however, the data indicated that they also prefer transactional behavior, exhibited by the higher than norm score. The scores for laissez-faire leadership fell within the norm range.

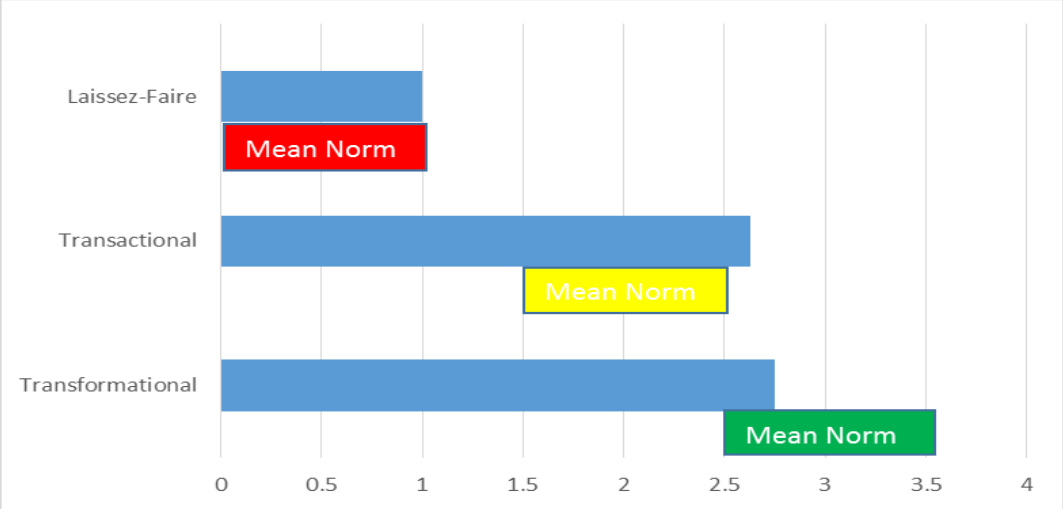

Figure 2. Subordinates' preferred leadership style.

Research Question 2

The second research question posed for this study was how does the president perceive her style as well as what she imagines her subordinates prefer? Her scores, represented in Table 3, were averaged to obtain an index score (Table 10) and graphically illustrated in Figures 3 and 4 for her self-assessed leadership style and the perceived preferred style of her subordinates. Each indexed score was then compared to the national norm.

Based on the president's self-assessed indexed score, she perceives herself to be a strong transformational leader. Her transactional and laissez-faire leadership scores are higher than the norm which indicate that she exhibits these behaviors more strongly than the national norm. These data show that leadership behaviors of an individual are not exclusively one style, but one style may be more predominant than the others.

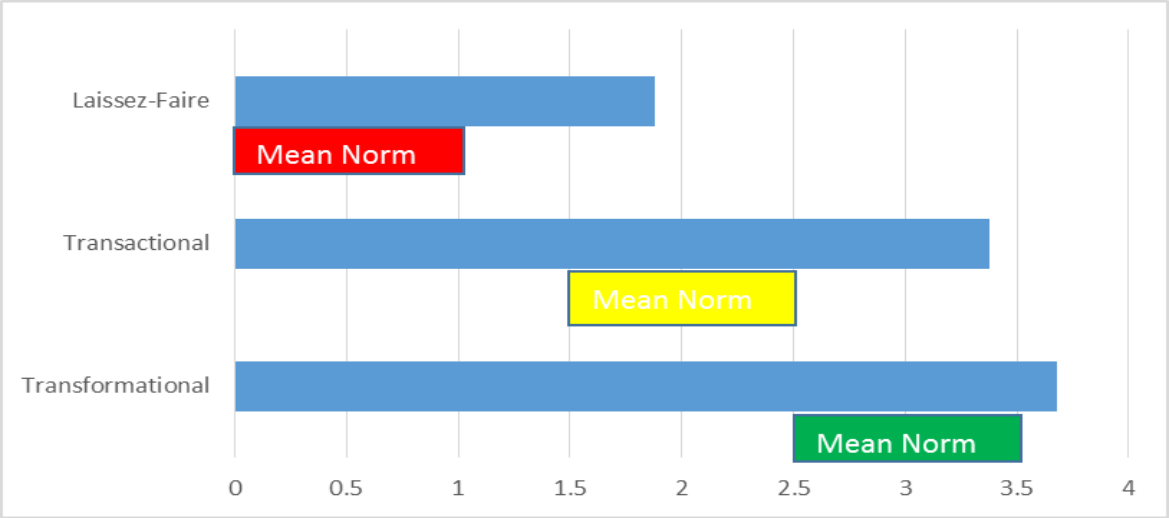

Figure 3. The president's self-assessed leadership style.

The indexed scores for leadership style the president perceived her subordinates prefer is represented in Figure 4. Based on the higher than the norm indexed score, her perception was that her subordinates prefer transformational leadership. The scores for transactional or laissez-faire are also above the national norm indicating that she identified that they prefer behaviors within these styles. When comparing the indexed scores for the president's current leadership style with what she perceived her subordinates prefer, the scores were close. Her current transformational leadership score was 3.68 and the preferred score was 3.0. The transactional leadership score for current style was 3.38 and the preferred score was 2.87. Laissez-faire leadership score for current and preferred leadership style was 1.88 and 2.0, respectively. These data implied that the president perceived her subordinates prefer her current leadership style. Conversely, the subordinates' indexed scores for current leadership style suggested that they, in fact, did not prefer the president's current style.

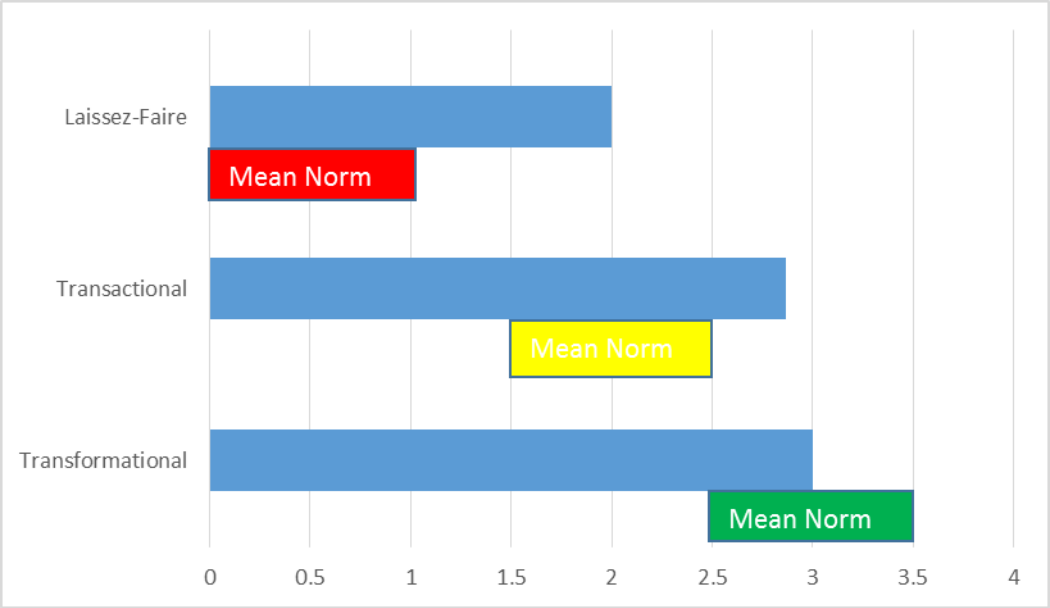

Figure 4. The president's perception of subordinates' preferred leadership style.

Research Question 3

The final research question investigated in this case study was based on the responses of the personnel regarding currently perceived and preferred leadership style, what advantages and challenges to transformational leadership implementation would these personnel anticipate. At the end of the MLQ questions in the subordinate questionnaire the participants were asked to answer each of the open-ended questions. Not all participants answered each question and the results are outlined below.

Ideal and effective leaders. When asked about characteristics and behaviors of their ideal leader or an effective leader, the consensus was that these terms were perceived as one and the same. Several participants indicated that an ideal leader (a) leads by example by getting in the trenches, (b) is willing to do tasks that they are asked to do, (c) spending time in the department to know what is going on but not just when chaos breaks out, and (d) being a team-

player. Another common thought was an ideal leader is able to see the bigger picture along with the individual details. Being open-minded and having an open door policy was also shared from more than one participant. One participant revealed that a leader may think they have an open door policy but without being open-minded, the open door may not truly be open. Other leadership characteristics that were shared on the questionnaire centered on personality traits such as confident, respectful, moral, ethical, kind, supportive, positive, reliable, energetic, approachable, and cooperative. Strong work ethic, planning for the future, delegating tasks, implementing "back-up" plans one at a time, and following through were also remarked as characteristics the subordinates felt were ideal.

Vision implementation advantages. The participants were then asked about their perception of advantages to implementation of a vision. A common theme that emerged among the responses was that a vision would assist in providing a more structured and organized environment. They felt that by having more structure and organization, the laboratory could improve overall services, be more effective, and increase productivity, therefore, make more money and survive in a highly competitive market. Another common thought shared was that having a vision facilitates team work, team-building, and group cohesion. Achievement of common goals easily and effectively and providing a sense of purpose could be facilitated by the implementation of a vision. One of the participant disclosed that implementation of a vision would maximize resources for the betterment of the laboratory and help employees achieve professional aspirations and development.

Vision implementation barriers. A mutual theme that surfaced as a barrier or challenge to implementing a vision is resistance to change. Some people do not like change, are not

positive about change, and some are not as welcoming to change and do not understand why things need to change. Conflict, anger, and resentment may result from resistance or deviation from the status quo. Several participants shared that they felt getting to work as a team, disagreeing with the vision or plan, and not wanting to work with certain people or teams were disadvantages they perceived. A noteworthy thought shared by one participant was implementation of a vision, without concrete definitions, may promote insubordination or actions of employees which, under the "good for everyone" assumption, actually hinders a functional work environment. Overachieving subordinates may over-reach or over-step authority.

Advantages or challenges of having an empowering leader. The participants shared their thoughts about what they could foresee as advantages and challenges to having a more empowering leader. Twenty answers were given with eleven being perceived as advantages and nine as barriers. Two of the answers were viewed as being both. Of the answers given no common theme or pattern was discernable; however, the responses gave insight into how more empowering leadership styles may be implemented in scientific laboratories. One participant stated that empowering leaders are willing to help everyone and someone to look to for answers and explain the answers in a logical and educational manner. A mentor would be wonderful. Another shared that if we had a confident leader, the employees would be proud of their job and want to move forward with the company as it grows. In a similar manner one response was if done properly, the workers will feel the positive 'vibe' from the leader and try to better themselves and their work habits. Empowering leaders, in the opinion of one participant, allow progressive and imaginative employees to advance and express ideas while developing a creative, positive, and flexible work environment. Having an empowering leader leads to a

stronger, cohesive group that is willing to work harder or longer (i.e., extra effort). One person believed that an empowering leader would get involved with problem solving and offer suggestions.

Barriers and challenges that were shared included thoughts like sometimes intimidation arises, personnel uncomfortable with change may challenge the leader or there is a dislike of the person in charge. Empowering leaders try to avoid dictating the how, what, when, and where, standing over your shoulder, or supervising every aspect to the job. Several of the participants stated that a challenge to having a more empowering leader would be a lack of guidance and supervision, and putting too much responsibility on the subordinate. A major challenge to an empowering leader, shared by one of the participants, was that with ill-defined parameters or limits of power attributed to the subordinates those empowered with responsibility and instructions may misinterpret the goals of that power and may overstep boundaries. One final thought about challenges to an empowering leader was that the leader may be too idealistic. An empowering leader should help the subordinates realize that there will be setbacks and that the end result will not be achieved flawlessly and without work or flexibility. It is here where teamwork will be of the greatest benefit. Another reply to the question about barriers to having a more empowering leader implied that in cases where the subordinates dislike change or the leader, a major barrier involves conflict and back-biting which may lead to dissent and dissatisfaction.

Organizational benefits to transformational leadership. The concluding question involved asking how the subordinates perceived organizational benefits to transformational leadership. One of the common responses was again a better more organized facility with better

time management skills and higher customer satisfaction. Better or higher performance was stated in conjunction with increased productivity leading to increased profits allowing the opportunity to stay competitive and viable. One response was if a leader acted as a mentor, then newer employees would continue to learn and grow with guidance. This new knowledge will make more efficient and valuable employees, which moves the company forward. Another response stated that people under a transformational leader would feel more empowered to learn more in regards to their position within the organization. Transformational leaders that offer to coach and mentor, offer individualized attention, and motivate and stimulate their subordinates would instill a sense of purpose and allow them to advance their knowledge and experience at their own pace by permitting them to ask questions suited to understanding the tasks. Having a transformational leader creates a more positive workplace and higher satisfaction levels. One of the participants claimed happy people do better work.

Summary

In this chapter I presented the data and results for the exploratory, qualitative case study of a highly scientific laboratory. The research questions posed in the study were the following: (a) What leadership style, as perceived by scientists, analysts, and technicians of a scientific laboratory, is the president currently using, and what leadership style do these personnel prefer? (b) How did the president perceive her style as well as what she imagined her subordinates preferred?, and (c) Based on the responses of the personnel regarding currently perceived and preferred leadership style, what advantages and challenges to transformational leadership implementation did these scientists, analysts, and technicians anticipate? The data indicated that the president practices a more transactional style, whereas, the scientists, analysts, and

technicians seem to prefer a more transformational leadership style. The president's self-assessment was that she practiced more transformational leadership behaviors and her perception of the preferred style of her subordinates was that they would prefer transformational leadership. Common advantages and barriers were determined through answers to the open-ended questions. Implementing a vision was seen as promoting a more structured and organized environment, building a cohesive team, and set common goals. Barriers seen by the subordinates were focused on resistance to change and lack of teamwork. The subordinates felt that having a more empowering leader was advantageous by being a mentor and coach, helping them progress and grow in their professional career, and help with problem solving. They also felt, however, that empowering leaders also had barriers in that they might be giving subordinates too much responsibility and lack of guidance or getting too personal with them. An organization can benefit from transformational leadership by promoting a more organized laboratory with higher customer satisfaction, increased productivity, and increased performance.

The data and findings from this chapter will be used in Chapter 5 to compare to findings in the literature and the theoretical framework. Limitations to trustworthiness will be refined and presented. Recommendations and implications to positive social change will also be introduced.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The overall purpose of this study, as stated previously, was to investigate subordinate perceptions of current and preferred leadership style from the perspective of scientists, analysts, and technicians; to determine the current leadership style and perceived subordinate preferred leadership style from the perspective of the president; and to identify advantages and barriers to the implementation of a transformational leadership style in highly technical organizations. The nature of the study involved obtaining information about leadership through the use of an exploratory, qualitative case study. The MLQ was used to ascertain leadership style, whether current or preferred, and questions regarding advantages and barriers to transformational leadership implementation as perceived by subordinates were asked.

I conducted the study in order to understand issues, both positive and negative, in applying a more empowering leadership style within highly technical organizations. Scholarly research and knowledge will be augmented and expanded because of the insights gained from this study. Results and findings from the study are discussed and interpreted in Chapter 5. Also included in this chapter are study limitations, recommendations for further research, and implications.

Interpretation of the Findings

As indicated in the literature review, Hater and Bass (1988), Bennett (2009), Keller (1992, 1995, 2006), Keegan and Hartog (2004), Ishikawa (2012), and Kim et al. (1999) implied that transformational leadership may be an effective leadership style within research and development organizations. My research indicated that scientists, analysts, and technicians

preferred transformational leadership, consistent with the scholarly literature; however, the data indicated that transactional leadership behaviors were also preferred. There was no statistical evidence to support a relationship of gender, job position, and tenure with leadership style. Transformational leadership has been indicated in this study to be applicable and advantageous in a scientific laboratory. As scholarly research documenting the application of the MLQ in scientific laboratories had not been conducted prior to this study, the findings add to the knowledge base, indicating that these organizations may benefit from a more empowering leadership style.

Research Question 1

In this study of a highly technical scientific laboratory, I wanted to determine the administrator's current leadership style in order to confirm previous research findings that leaders in technical organizations practice a more directive style of leadership. With the MLQ, each leadership style (transformational, transactional, and laissez-faire) can be determined from a score generated based on the frequency with which the particular behavior is detected. Laissez-faire and transformational leadership behaviors were found to be present. However, these leadership styles were not the most prominent. The subordinates employed at the scientific laboratory indicated that they perceived that the president was practicing a more transactional style. Berson and Linton (2005) found in their study of 511 research engineers and scientists that both transformational and transactional leadership styles were used, with transformational leadership being the more effective style. The findings in my study confirm that both styles were present in the president's leadership of the laboratory, based on reporting by the employees.

The subordinates' perception of current leadership style centered on transactional traits, whereas, the president's self-perception focused on transformational leadership behaviors. Of the research studies performed in the literature review, there were none that compared subordinates' responses with leaders' perceptions. An individual's environment and experiences influence his or her perspectives and outlook, which may affect the answers given on the MLQ. In this study, actions the president took and interactions she had with subordinates, occurring recently or in the past, may have also influenced subordinates' perceptions of her leadership style. One participant indicated that the president favored one particular department, and this perception may have biased the subordinate and affected the responses. The president's responses might have been affected by her own ego and self-awareness, which shaped her self-perception. She may have perceived that she embodied transformational leadership traits when she interacted with her subordinates, yet her subordinates perceived something different.

In some situations, the message sent by a person is not always received by others in the manner in which it was intended and may create misunderstanding, confusion, and even hostility. These attitudes could have affected the subordinates' perception of the president's current leadership style. For example, the president might have considered watching over a subordinate while doing analyses to be coaching and mentoring, while the subordinate viewed the interaction as micromanaging. Building more open relationships with her subordinates and increasing rapport with the department may enhance transformational leadership perceptions among the subordinates. Additionally, open and more effective communication between individuals or groups and the president may aid in changing the subordinates' assessment of the president's leadership from transactional to more transformational.

The second part of the first research question was designed to ascertain the preferred leadership style of the scientists, analysts, and technicians. Being a scientist myself, I was not surprised that transformational leadership was found to be the preferred style. However, what I did find interesting was that these employees of the chosen laboratory expressed a higher preference for transactional leadership. While reviewing the scholarly literature, indications were present that transformational leadership would be preferred above and beyond all other styles. Yet, in this case, transactional leadership behaviors were also preferred, although not as strongly. This finding suggests that situational leadership may be a more appropriate leadership style for leading scientists, analysts, and technicians in scientific laboratories.

Research Question 2

For the second research question, I wanted to determine what leadership style the president of a scientific laboratory was using, based on self-evaluation, and what style she thought her subordinates would prefer. Her self-assessment of leadership showed that she perceived herself to be more transformational but also using some transactional leadership traits. She also perceived that her subordinates preferred a transformational leader. The findings show, however, that she scored herself higher in transformational leadership style than what her subordinates did, and she scored their preferences for transformational leadership higher than they did. This disconnect between perceptions of her current style might have been attributable to situations that occurred that influenced the scoring. Perhaps one of the participants had a poor performance review recently, and residual feelings about that instance were reflected in the questionnaire answers. These findings also intimate that situational leadership may be more appropriate.

Research Question 3

The third research question was designed to ascertain what advantages and challenges to transformational leadership implementation these scientists, analysts, technicians anticipated based on their perception of current and preferred leadership styles. Based on the answers, characteristics of an ideal leader and effective leader were viewed by the participants as synonymous. The common theme gleaned from the responses was that an ideal leader or effective leader leads by example, delegates tasks, is open-minded and approachable, is confident, is respectful, has a strong work ethic, is committed, is reliable, offers incentives, and spends time in the departments. When asked about advantages to having a vision, the consensus focused around more structure, organization, team building, and group cohesion. The primary theme discovered in reviewing responses for disadvantages of vision implementation was resistance to change and conflict.

Effective leadership is situational, and effective leaders adapt their style around the development of their subordinates (Hershey, Blanchard, & Johnson, 2012). Situational leadership encompasses directive and supportive behaviors based on the situation and needs of the subordinates, which are used in combination to achieve organizational or group goals. Characteristics of an ideal leader and an effective leader may appear to be similar; however, an ideal leader is not the same as an effective leader. Subordinates have a sense of what type of leader they want to follow, but this leadership type is based on their experiences and circumstances. In order to meet an organizational objective or implement a vision, a leader may be effective but use leadership behaviors that are counter to the subordinates' ideal. Leaders may also be viewed as being ideal yet be ineffective because the situation or circumstance is

counterproductive to the tasks or demands at hand. More empowering leadership styles (i.e., transformational) may be popular and viewed as ideal; however, performance or changing demands within the organization may render transformational leadership inappropriate.

Situational leadership allows for leaders to adapt their style to changing environments (Hershey, Blanchard, & Johnson, 2012). A different style may be required when managing a department or team within the scientific laboratory than is necessary for individuals. Scientific laboratories may be governed by regulatory entities which require a task-oriented, regulated environment such that the leader would need to focus on tasks and monitor performance and resources closely, thereby, being more directive and transactional. Other scientific laboratories may have more flexibility to incorporate more autonomy, less rigid supervision, and provide more coaching, mentoring, and delegating, hence, leading in a more transformational style.

Using situational leadership may aid in overcoming the common, recurring barrier of resistance to change or resentment. Effective situational leaders focus on the individual to help them to develop and improve. Concentrating on the subordinates' needs when the situation dictates can foster trust building and group cohesion, which impacts the perception of leadership effectiveness.

There has been no published research linking transactional and transformational leadership with situational leadership. In this case it is plausible to conclude there is evidence to suggest that the most effective leadership style may need to focus on situational leadership, rather than just one specific style, where the leader uses behaviors and techniques based on each situation, individual, or group.

Limitations of the Study

Limitations to the study were annotated in Chapter 1. These limitations were described as (a) data were being sought from only one scientific laboratory, and (b) the study was relying on self-reported data. I was interested in obtaining data from one laboratory small enough in size and organizational structure that the intended population of participants had knowledge of and access to the president. Scientists, analysts, and technicians employed at larger scientific laboratories with more structured executive management may have different experiences that could alter the interpretation of leadership style. Having less access to upper management may also impact perception of leadership style.

Data may be biased by the use of a self-reported questionnaire instrument. The administrative and subordinate questionnaires were used to protect confidentiality of the participants as well as to help minimize stress and discomfort. Some people may be uncomfortable giving open and honest answers and may choose to bias the findings by providing answers they perceive are desired. Using this questionnaire limited researcher bias because the participants had no contact with me.

Another perceived limitation to this study was the one-time data collection event. Experiences and situations happening within the workplace could influence the answers given on the questionnaires at any given time and the outcome may be entirely different. A longitudinal study may refine the determination of leadership style among the scientists, analysts, and technicians.

The small sample size may be perceived as a limitation to the study in addition to the specific population chosen for the study. This study was focused on the perspectives of the

president and scientists, analysts, and technicians. Obtaining current leadership perceptions from nontechnical staff may have impacted the current leadership style and changed the interpretation.

Recommendations

In order to improve knowledge and understanding of more empowering leadership and implementation in highly technical scientific laboratories, similar research should be performed within various sized laboratories. This study focused on a small laboratory with limited executive management. The findings gained from additional studies may confirm or contradict the perspectives of scientists, analysts, and technicians in a relatively small laboratory environment.

Another study that would be of value is to compare findings from laboratories that differ in size, organizational structure, and mission or function. One question to address is how laboratory size, structure, or mission affect the perspective of leadership style and implementation issues. Comparing data from laboratories with similar structure or geographic area may also yield interesting perspectives into scientific laboratory leadership.

Investigating current and preferred leadership style within scientific laboratories from both scientific staff and support staff would be another study. Comparing these perspectives would show if job position or function influences the viewpoint of leadership style and advantages and barriers of implementation of transformational leadership concepts. Additionally, studying the distance in job functions between subordinates and leaders in scientific staff versus support staff may provide insight into leadership style perceptions.

Data were collected in a one-time event. Using a more longitudinal approach would allow responses to be compared over time. These responses may show how perspectives change over

time in terms of leadership style preferences or current perspective. Changes in answers may show how experiences could influence the subordinate's perspectives or perceptions.

Implications

The knowledge gained as a result of conducting this study is important to leadership in scientific laboratories. As discussed in the literature review, there is limited scholarly research available regarding transformational leadership implementation in highly technical organizations. The study findings strengthen the supposition that transformational leadership is applicable in a wide variety of organizational types, including technical organizations and scientific laboratories (where little research has been performed).

Scientific laboratories are not limited in size or function. The focus of this research was to perform a study at a small scientific laboratory with limited middle management where the subordinates had interactions with an administrator. Findings in larger laboratories where subordinates are removed from the top administrator may be similar; however, this study provides a beginning for further research into the area of transformational leadership implementation.

In scientific laboratories, leaders having knowledge about what style they are currently using and what styles are preferred by their subordinates may aid in changing the organizational climate and perceptions of effectiveness. Effective leadership, as suggested by Hershey et al. (2012), is situational where the leader implements aspects of both a directive and supportive style centered on the subordinates and their needs. This leadership style implies that in certain circumstances and situations within the laboratory, the leader (whether the president or other

supervisor) may need to use aspects of transformational leadership and in other cases employ transactional behaviors.

Transformational leadership, as outlined in the literature review in Chapter 2, has been shown to influence job satisfaction, job performance, and organizational commitment and survivability. Transformational leadership has also been presented as an effective leadership style that has been implemented in a myriad of organizations Development of an effective leadership style where the leader uses behaviors and techniques based on each situation, individual, or group, is flexible, and focuses on individual needs, such as situational leadership, rather than emphasizing just one specific style, may lead to higher satisfaction and performance levels, which, in turn, affect organizational commitment and survival.

Conclusion

The problem addressed in this study was the lack of scholarly research and understanding of the issues in applying and implementing transformational leadership concepts within a scientific laboratory. The purpose of this case study was to investigate subordinate perceptions of current and preferred leadership style, to determine the current leadership style and the preferred style of subordinates' perceived by the president of the scientific laboratory, and to establish advantages and barriers to implementing transformational leadership.

Results from the study indicated that subordinates perceive their leader to embody transactional leadership, while they prefer more transformational leadership. She, on the other hand, sees herself as a transformational leader and believes her subordinates prefer transformational leadership. The subordinates indicated that communicating better with them about goals and achievements, spending time in the departments, and interacting with the

employees would benefit the organization. Team-building and more group cohesion may help change the frequency the subordinates perceive the president is using transactional behavior and by focusing more on the individuals and groups may elevate her leadership style to be more transformational than transactional.

Although the study findings indicate that transformational leadership is applicable and is the preferred leadership style, the findings also show that transactional behaviors may also be appropriate. Therefore, situational leadership may be a more effective leadership style in scientific laboratories because the leader employs both directive and supportive behaviors based on current circumstances and situations and focuses on the needs and development of individuals. Situational leadership also allows the leader to use different styles for different individuals or groups.

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Appendix A: Letter of Permission

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To whom it may concern,

This letter is to grant permission for the above named person to use the following copyright material;

Instrument: ***Multifactor Leadership Questionnaire***

Authors: ***Bruce Avolio and Bernard Bass***

Copyright: ***1995 by Bruce Avolio and Bernard Bass***

for his/her thesis research.

Five sample items from this instrument may be reproduced for inclusion in a proposal, thesis, or dissertation.

The entire instrument may not be included or reproduced at any time in any other published material.

Sincerely,

Robert Most
Mind Garden, Inc.
www.mindgarden.com

Appendix B: Subordinates' Questionnaire

Subordinate Questionnaire

Consent Form and Invitation to participate

You are invited to take part in a research study of "Advantages and Barriers to Transformational Leadership Implementation in a Highly Technical Scientific Laboratory". I am inviting scientists, analysts, and technicians of a scientific laboratory to be in the study. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This study is being conducted by Rachelle Smith, a doctoral student at Walden University.

Background Information:
The purpose of this study is to investigate the perceived current and preferred leadership style of scientists, analysts, and technicians within a scientific organization and establish their perceptions of advantages and barriers to implementing a more empowering style of leadership.

Procedures:
If you agree to be in this study, you will be asked to participate by answering 45 statements about the current leadership style of the president and your preferred leadership style by judging the frequency of each statement on a scale of 0 to 4 with frequency being *0 =not at all, 1 =once in a while, 2 =sometimes, 3 =fairly often, and 4 =frequently if not always*. Following the survey-type statements, you will be asked questions relating to your perceived advantages and challenges to implementing a transformational leadership style. The time required to participate should not exceed one hour.

Voluntary Nature of the Study:
This study is voluntary. Everyone will respect your decision of whether or not you choose to be in the study. If you decide to join the study now, you can still change your mind later. You may stop at any time.

Risks and Benefits of Being in the Study:
Being in this type of study involves some risk of the minor discomforts that can be encountered in daily life, such as stress. Being in this study would not pose risk to your safety or wellbeing.

The study is designed to identify the perceived current and preferred leadership style of subordinates like you and how the president perceives his leadership style and how she imagines your preferred style might be. This study will aid in understanding how we view our leaders and how a more empowering leadership style, such as transformational leadership, may be advantageous in scientific laboratories.

Payment:
There will be no compensation for participating in this study.

Privacy:
Any information you provide will be kept confidential. I will not collect any personal information and will not include your name or anything else that could identify you in the study reports. Data will be kept secure by being stored on a transportable storage media that will be kept in my custody. Data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions:
You may ask any questions you have now. Or if you have questions later, you may contact me via phone number 936-661-1343 or email at rachelle.smith@waldenu.edu. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 612-312-1210. Walden University's approval number for this study is **06-16-14-0033768** and it expires on **15 June 2015.**

Please print or save this consent form for your records.

Statement of Consent:

I have read the above information and I feel I understand my role in the study well enough to make a decision about my involvement. By completing the questionnaire, I understand that I am agreeing to the terms described above.

The questionnaire has been sent to you by one of your colleagues. Please return via email to me at rachelle.smith@waldenu.edu.

The questionnaire is designed to describe the leadership style of the president of your organization and your preferred leadership style, as you perceive it. Please answer the questions on this questionnaire. If an item is irrelevant or if you are unsure or do not know the answer, leave it blank. Answers will be kept confidential. Judge how frequently each statement applies to the president and your preferred leader. Use the following rating scale: 0-not at all, 1-once in a while, 2-sometimes, 3-fairly often, 4-frequently if not always. Enter the rating in the appropriate column.

Statement	President	Preferred
Provides me with assistance in exchange for my efforts		

Re-examines critical assumptions to question whether they are appropriate		
Fails to interfere until problems become serious		
Focuses attention on irregularities, mistakes, exceptions, and deviations from standards		
Avoid getting involved when important issues arise		
Talks about their most important values and benefits		
Is absent when needed		
Seeks differing perspectives when solving problems		
Talks optimistically about the future		
Instills pride in me for being associated with him/her		
Discusses in specific terms who is responsible for achieving performance targets		
Waits for things to go wrong before taking action		
Talks enthusiastically about what needs to be accomplished		
Specifies the importance of having a strong sense of purpose		
Spends time teaching and coaching		
Makes clear what one can expect to receive when performance goals are achieved		
Shows that he/she is a firm believer in “If it ain’t broke, don’t fix it”		
Goes beyond self-interest for the good of the group		
Treats me as an individual rather than just as a member of a group		
Demonstrates that problems must become chronic before taking action		
Acts in ways that builds my respect		
Concentrates his/her full attention on dealing with mistakes, complaints, and failures		
Considers the moral and ethical consequences of decisions		
Keeps track of all mistakes		
Displays a sense of power and confidence		
Articulates a compelling vision of the future		
Directs my attention toward failures to meet standards		
Avoids making decisions		
Considers me as having different needs, abilities, and aspirations from others		
Gets me to look at problems from many different angles		

Helps me to develop my strengths		
Suggests new ways of looking at how to complete assignments		
Delays responding to urgent questions		
Emphasizes the importance of having a collective sense of mission		
Expresses satisfaction when I meet expectations		
Expresses confidence that goals will be achieved		
Is effective in meeting my job-related needs		
Uses methods of leadership that are satisfying		
Gets me to do more than I expected to do		
Is effective in representing me to higher authority		
Works with me in a satisfactory way		
Heightens my desire to succeed		
Is effective in meeting organizational requirements		
Increases my willingness to try harder		
Leads a group that is effective		

Thinking of your preferred leadership style please answer the following questions:

1. In your opinion what characterizes an ideal leader?

2. What are characteristics of an effective leader?

3. If your ideal leader created and implemented a vision for the laboratory, describe any advantages you might envision.

4. Describe any challenges or barriers you visualize may be encountered by implementation of a vision.

5. What advantages or challenges might you foresee by having an empowering leader?

Aspects to transformational leadership include: being a mentor and coach, offer individualized attention, and motivate and stimulate workers.

6. If your ideal leader demonstrates any of these behaviors, how would your organization benefit by these attributes?

7. What advice could you offer the president of your organization about the leadership style?

8. What aspects or attributes would you change in the president of your organization to match your ideal leader?

Gender: M F

Job Title: Scientist Technician Analyst

Time with company: 2 years or less 3 to 5 years more than 5 years

Appendix C: Administrative Questionnaire

Consent Form and Invitation to participate

You are invited to take part in a research study of "Advantages and Barriers to Transformational Leadership Implementation in a Highly Technical Scientific Laboratory". I am inviting the president of a scientific laboratory to be in the study. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This study is being conducted by Rachelle Smith, a doctoral student at Walden University.

Background Information:
The purpose of this study is to determine the current leadership style of the president of a scientific laboratory and what style of leadership the president perceives the scientists, analysts, and technicians prefer.

Procedures:
If you agree to be in this study, you will be asked to participate by answering 45 statements about your current leadership style and what leadership style you perceive the scientists, analysts, and technicians prefer. Judge the frequency of each statement on a scale of 0 to 4 with frequency being *0 = not at all, 1 = once in a while, 2 = sometimes, 3 = fairly often, and 4 = frequently if not always*. The time required to participate should not exceed one hour.

Voluntary Nature of the Study:
This study is voluntary. Everyone will respect your decision of whether or not you choose to be in the study. If you decide to join the study now, you can still change your mind later. You may stop at any time.

Risks and Benefits of Being in the Study:
Being in this type of study involves some risk of the minor discomforts that can be encountered in daily life, such as stress. Being in this study would not pose risk to your safety or well-being.

The study is designed to identify the perceived current and preferred leadership style of scientists, analysts, and technicians and how you, the president, perceive your leadership style and how you imagine your subordinates' preferred style might be. This study will aid in understanding how a more empowering leadership style, such as transformational leadership, may be advantageous in scientific laboratories.

Payment:
There will be no compensation for participating in this study.

Privacy:

Any information you provide will be kept confidential. I will not collect any personal information and will not include your name or anything else that could identify you in the study reports. Data will be kept secure by being stored on a transportable storage media that will be kept in my custody. Data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions:
You may ask any questions you have now. Or if you have questions later, you may contact me via phone number 936-661-1343 or email at rachelle.smith@waldenu.edu. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 612-312-1210. Walden University's approval number for this study is **06-16-14-0033768** and it expires on **15 June 2015.**

Please print or save this consent form for your records.

Statement of Consent:

I have read the above information and I feel I understand my role in the study well enough to make a decision about my involvement. By completing the questionnaire, I understand that I am agreeing to the terms described above.

The questionnaire can be found at **https://www.surveymonkey.com/s/FFNJJJ3**.

The questionnaire is designed to describe your perceived leadership style and what you imagine the preferred leadership style of the scientists, analysts, and technicians is. Please answer the questions on this questionnaire. If an item is irrelevant or if you are unsure or do not know the answer, leave it blank. Answers will be kept confidential. Judge how frequently each statement applies to you and your perception of scientists, analysts, and technicians preferred leadership. Use the following rating scale: 0-not at all, 1-once in a while, 2-sometimes, 3-fairly often, 4-frequently if not always. Enter the rating in the appropriate column.

Statement	Me	Scientists, analysts, and technicians

		preferred leadership
Provide others with assistance in exchange for their efforts		
Re-examines critical assumptions to question whether they are appropriate		
Fail to interfere until problems become serious		
Focus attention on irregularities, mistakes, exceptions, and deviations from standards		
Avoid getting involved when important issues arise		
Talk about their most important values and benefits		
Is absent when needed		
Seek differing perspectives when solving problems		
Talk optimistically about the future		
Instill pride in others for being associated with me		
Discuss in specific terms who is responsible for achieving performance targets		
Wait for things to go wrong before taking action		
Talk enthusiastically about what needs to be accomplished		
Specify the importance of having a strong sense of purpose		
Spend time teaching and coaching		
Make clear what one can expect to receive when performance goals are achieved		
Show that I am a firm believer in “If it ain’t broke, don’t fix it”		
Go beyond self-interest for the good of the group		
Treat others as individuals rather than just as a member of a group		
Demonstrate that problems must become chronic before taking action		
Act in ways that builds others’ respect for me		
Concentrate full attention on dealing with mistakes, complaints, and failures		
Consider the moral and ethical consequences of decisions		
Keep track of all mistakes		
Display a sense of power and confidence		
Articulate a compelling vision of the future		
Direct my attention toward failures to meet standards		

Avoid making decisions		
Consider an individual as having different needs, abilities, and aspirations from others		
Get others to look at problems from many different angles		
Help others to develop their strengths		
Suggest new ways of looking at how to complete assignments		
Delay responding to urgent questions		
Emphasize the importance of having a collective sense of mission		
Express satisfaction when others meet expectations		
Express confidence that goals will be achieved		
Is effective in meeting their job-related needs		
Use methods of leadership that are satisfying		
Get them to do more than they expected to do		
Is effective in representing others to higher authority		
Work with them in a satisfactory way		
Heightens their desire to succeed		
Is effective in meeting organizational requirements		
Increase others' willingness to try harder		
Leads a group that is effective		

Appendix D: Pilot Study Consent Form

Pilot Study Consent Form

You are invited to take part in a pilot study for "Advantages and Barriers to Transformational Leadership Implementation in a Highly Technical Scientific Laboratory". I am inviting scientists and analysts to be part of the study. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This study is being conducted by Rachelle Smith, a doctoral student at Walden University. You already know me as the Operations Manager, but this study is separate from that role.

Background Information:
The purpose of this study is to (a) investigate the perceived current and preferred leadership style of scientists, analysts, and technicians, (b) to determine the current leadership style and what is the preferred style of subordinates' perceived by the president of the scientific laboratory, and (c) establish their perceptions of advantages and barriers to implementing a more empowering style of leadership.

Procedures:
If you agree to be in this study, you will be asked to:

- Review the subordinate and administrative questionnaires. Rate each question and scale for appropriateness as a whole.
- Examine each checklist response and recommend modifications if required. The time required to participate is a one-time event and should not exceed one hour.

Voluntary Nature of the Study:
This study is voluntary. Everyone will respect your decision of whether or not you choose to be in the study. If you decide to participate now, you can still change your mind later. You may stop at any time.

Risks and Benefits of Being in the Study:
Being in this type of study involves some risk of the minor discomforts that can be encountered in daily life, such as stress. Being in this study would not pose risk to your safety or wellbeing.

The study is designed to identify the perceived current and preferred leadership style of scientists, analysts, and technicians and how the president perceives his leadership style and how he imagines their preferred style might be. This study will aid in understanding how we view our leaders and how a more empowering leadership style, such as transformational leadership, may be advantageous in scientific laboratories.

Payment:
There will be no compensation for participating in this study.

Privacy:
Any information you provide will be kept confidential. I will not collect any personal information and will not include your name or anything else that could identify you in the study reports. Data will be kept secure by being stored on a transportable storage media that will be kept in my custody. Data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions:
You may ask any questions you have now. Or if you have questions later, you may contact me via phone number 936-661-1343 or email at rachelle.smith@waldenu.edu. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 612-312-1210. Walden University's approval number for this study is **06-16-14-0033768** and it expires on **15 June 2015.**

Please keep this consent form for your records.

Statement of Consent:

I have read the above information and I feel I understand my role in the study well enough to make a decision about my involvement. By replying to this email with the words, "I consent", I understand that I am agreeing to the terms described above.

Appendix E: Checklist

Checklist		
Task	**Y**	**N**
Typographical errors present		
Misspelled words		
Survey is easy to read		
Survey has appropriate vocabulary		
Survey is an appropriate length		
Style of items too monotonous		
Items flow well		
Items are appropriate for respondents		
Survey contains sensitive items		
Survey contains cultural barriers		

Appendix F: MLQ Scoring Key

MLQ Multifactor Leadership Questionnaire Scoring Key (5x) Short

My Name: _____ Date: _____

Organization ID #: _____ Leader ID #: _____

Scoring: The MLQ scale scores are average scores for the items on the scale. The score can be derived by summing the items and dividing by the number of items that make up the scale. All of the leadership style scales have four items, Extra Effort has three items, Effectiveness has four items, and Satisfaction has two items.

Not at all	Once in a while	Sometimes	Fairly often		Frequently, if not always
0	1	2	3	4	

Idealized Influence (Attributed) total/4 =
Idealized Influence (Behavior) total/4 =
Inspirational Motivation total/4 =
Intellectual Stimulation total/4 =
Individualized Consideration total/4 =
Contingent Reward total/4 =
Management-by-Exception (Active) total/4 =
Management-by-Exception (Passive) total/4 =
Laissez-faire Leadership total/4 =
Extra Effort total/3 =
Effectiveness total/4 =
Satisfaction total/2 =

1. Contingent Reward..... 0 1 2 3 4
2. Intellectual Stimulation..... 0 1 2 3 4
3. Management-by-Exception (Passive) 0 1 2 3 4
4. Management-by-Exception (Active)..... 0 1 2 3 4
5. Laissez-faire 0 1 2 3 4
6. Idealized Influence (Behavior) 0 1 2 3 4
7. Laissez-faire 0 1 2 3 4
8. Intellectual Stimulation..... 0 1 2 3 4
9. Inspirational Motivation..... 0 1 2 3 4
10. Idealized Influence (Attributed) 0 1 2 3 4
11. Contingent Reward..... 0 1 2 3 4
12. Management-by-Exception (Passive) 0 1 2 3 4
13. Inspirational Motivation..... 0 1 2 3 4
14. Idealized Influence (Behavior) 0 1 2 3 4
15. Individualized Consideration..... 0 1 2 3 4
16. Contingent Reward..... 0 1 2 3 4
17. Management-by-Exception (Passive) 0 1 2 3 4
18. Idealized Influence (Attributed) 0 1 2 3 4
19. Individualized Consideration..... 0 1 2 3 4
20. Management-by-Exception (Passive) ……..... 0 1 2 3 4
21. Idealized Influence (Attributed) 0 1 2 3 4
22. Management-by-Exception (Active)..... 0 1 2 3 4
23. Idealized Influence (Behavior) 0 1 2 3 4
24. Management-by-Exception (Active)..... 0 1 2 3 4
25. Idealized Influence (Attributed) 0 1 2 3 4

26. Inspirational Motivation..... 0 1 2 3 4
27. Management-by-Exception (Active)..... 0 1 2 3 4
28. Laissez-faire 0 1 2 3 4
29. Individualized Consideration..... 0 1 2 3 4
30. Intellectual Stimulation..... 0 1 2 3 4
31. Individualized Consideration..... 0 1 2 3 4
32. Intellectual Stimulation..... 0 1 2 3 4
33. Laissez-faire 0 1 2 3 4
34. Idealized Influence (Behavior) 0 1 2 3 4
35. Contingent Reward 0 1 2 3 4
36. Inspirational Motivation..... 0 1 2 3 4
37. Effectiveness..... 0 1 2 3 4
38. Satisfaction..... 0 1 2 3 4
39. Extra Effort..... 0 1 2 3 4
40. Effectiveness..... 0 1 2 3 4
41. Satisfaction..... 0 1 2 3 4
42. Extra Effort..... 0 1 2 3 4
43. Effectiveness..... 0 1 2 3 4
44. Extra Effort..... 0 1 2 3 4
45. Effectiveness..... 0 1 2 3 4

Curriculum Vitae

Rachelle Smith

Education:

2000 M.S. Chemistry Sam Houston State University

1990 B.S. Chemistry Westminster College of Salt Lake City

Professional Experience:

2000- Present Analytical Laboratory Director

1990-1997 Chemist and Group Coordinator

Professional Affiliations:

American Chemical Society

ASTM

AOAC